APPENDIX I

Nicola Valley OCP

NICOLA VALLEY

OFFICIAL COMMUNITY PLAN

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**Please check with the TNRD
for current information on this Bylaw.**

AMENDMENTS OT THE TEXT OF NICOLA VALLEY OFFICIAL

COMMUNITY PLAN ADOPTION BYLAW NO. 1450

1. Bylaw No. 1753 – Reconsidered and Adopted September 23, 1999.

   - Amend Section 9.0
   - Insert a new Section 9.6
   - See Rezoning Application RZ-N-21 for further information.

2. Bylaw No. 1798 – Reconsidered and Adopted April 12, 2001.

   - Amend Section 4.1
   - Insert a commercial land use in Section 4.1 – Comprehensive Entertainment Commercial.
   - Insert a new Section 4.9 – Comprehensive Entertainment Commercial
   - Insert a new Section 16 – Development Permit Areas
   - The land use designation on Lot B, Section 4, Township 91 and District Lot 166, Kamloops Division Yale District, Plan KAP59518 is changed from Rural Resource to Comprehensive Entertainment Commercial.
   - See Rezoning Application RZ-N-22 for further information.

3. Bylaw No. 1866 – Reconsidered and Adopted February 14, 2002.

   Insert Development Permit Area No. Two – Active Mountain under Section 16, Development Permit Areas.

INTRODUCTION:

The Nicola Valley Official Community Plan has been prepared pursuant to Part 29 of the **Local Government Act** and consists of:

i) a statement of the Board of Directors' objectives, policies and implementation program contained in this Schedule;

ii) maps of the future land use included in this Schedule as the Nicola Valley Official Community Plan Maps.

The Nicola Valley Official Community Plan provides a policy framework and serves as a basis for decisions and actions related to the use and development of all lands within the Nicola Valley Official Community Plan Area shown on Maps 1-7. It is based on the criteria and mandatory considerations set out in the **Local Government Act**.

OTHER LEGISLATION:

All or parts of the Nicola Valley Official Community Plan Area are subject to other Federal and Provincial legislation, including but not limited to the **Forest Act**, the **Health Act**, the **Land Act**, the **Mines Act**, the **Mineral Tenure Act** and the **Agricultural Land Commission Act**. In particular, a number of objectives, policies and land use designations of this Plan apply to land located in the Agricultural Land Reserve (ALR). Where the provisions of this Plan provide for the development of land located in the ALR which is not consistent with the **Agricultural Land Reserve Act,** regulations made thereunder or orders of the Commission, approval of the Land Reserve Commission is required. Also the Ministry of Energy and Mines is responsible for administering energy and mineral resources in the area. Furthermore, a large portion of the Plan Area is Provincial Forest land which can only be managed and used for specific timber, grazing, recreation and resource purposes specified in the **Forest Act**.

SCHEDULE "A"

This is Schedule "A" referred to in the Nicola Valley Official Community Plan Adoption Bylaw No. 1450, 1995.

NICOLA VALLEY OFFICIAL COMMUNITY PLAN

OBJECTIVES & POLICIES

The broad objectives and policies of the Board of Directors with respect to the form and character of existing and proposed land use and servicing requirements within the Nicola Valley Official Community Plan Area are set out in this section. The objectives are to be achieved through the implementation of the listed policies which follow.

NICOLA VALLEY OFFICIAL COMMUNITY PLAN

1. FORM AND CHARACTER OF EXISTING AND FUTURE LAND USE

Objective:

1.0 TO DESIGNATE AND DIRECT THE PATTERN OF EXISTING AND FUTURE LAND USE IN ORDER TO PROMOTE ORDERLY GROWTH, PROVIDE OPPORTUNITY FOR A VARIETY OF RESIDENTIAL LIFESTYLES AND LAND USES, SUSTAIN THE EXISTING RESOURCE BASE AND PRESERVE THE NATURAL ENVIRONMENTAL CHARACTERISTICS OF THE PLAN AREA.

Policies:

1.1 That the future pattern of land use in the Nicola Valley Official Community Plan Area be consistent with the Official Community Plan Maps based on the following general guidelines:

a) All existing Residential development will be recognized. Opportunities for a range of nev Residential development subject to established development criteria and compliance with the density and servicing standards contained in the applicable Zoning Bylaw will be directed towards those lands appropriately designated on Maps 2-7.

b) Commercial development in general will be encouraged to locate within the City of Merritt. New development of a tourist or local commercial nature subject to established locational criteria will be encouraged to locate on or in close proximity to those lands appropriately designated on Maps 2 and 4-6.

c) Industrial development will be encouraged to locate within the City of Merritt. New Industrial development subject to established development criteria will be directed to thos lands designated Industrial and Future Industrial on Maps 2-4 and 7.

d) Agriculture, Transportation, Water Resources, Fisheries, Waterfowl, Wildlife, Recreation Heritage Conservation, Sand/Gravel Resource and Mineral Resource land uses will be recognized and development that will impact these uses will be encouraged to develop in accordance with the Plan's objectives, policies and the intergovernmental policies of the affected agencies having authority.

e) Environmental Constraints such as environmentally sensitive areas, hazard lands and floodplains will be recognized and development within these areas will be discouraged or restricted.

f) Public Facilities/Institutional Uses will be encouraged where there is need, financial capability and appropriate servicing standards. Major public facilities or institutional uses however will be encouraged to locate within the City of Merritt.

1.2 The scheme of existing and future land uses within the Plan Area are described through the following designations:

a) Residential Development
   - Urban Residential
   - Mobile Home Park
   - Country Residential
   - Country Residential/Urban Residential Conversion
   - Residential Development in a Rural Resource Area

b) Rural Resource

c) Commercial Development
   - Retail Commercial
   - Service Commercial
   - Highway Commercial
   - Tourist Commercial
   - Temporary Commercial

d) Industrial Development
   - Industrial
   - Future Industrial
   - Temporary Industrial

e) Sand/Gravel Resources and Mineral Resources

f) Agriculture

g) Transportation

h) Public Facility/Institutional

i) Water Resources

j) Fisheries, Waterfowl and Wildlife

k) Environmental Constraints
   - Environmentally Sensitive Areas
   - Hazard Lands
   - Floodplains

l) Recreation

m) Heritage Conservation
- Institutional/Heritage
- Archaeological Sites

n) Implementation

2. RESIDENTIAL DEVELOPMENT

Objective:

2.0 TO PROVIDE OPPORTUNITIES FOR A VARIETY OF TYPES OF RESIDENTIAL DEVELOPMENT WITHIN APPROPRIATE AREAS OF THE PLAN.

Policies:

2.1 This Plan provides for five (5) residential types of varying densities and servicing requirements.

- Urban Residential
- Mobile Home Park
- Country Residential
- Rural Residential
- Residential Development in a Rural Resource Area

Residential development shall locate in appropriately designated areas shown on Maps 2-6.

Urban Residential:

2.2 The minimum parcel size for an Urban Residential parcel is dependent upon the density and servicing standards contained in the relevant provisions of the applicable Zoning Bylaw.

2.3 New Urban Residential subdivision and development shall be encouraged to locate in those areas designated as Urban Residential on Land Use Maps 2 and 4, provided that:

a) the subdivision or development is serviced by a community water system;

b) there is sufficient area and adequate soils for sewage disposal;

c) the subdivision or development meets the necessary floodproofing requirements if within a Provincial floodplain.

2.4 New Urban Residential subdivision and development may also be permitted in those areas designated Urban Residential Conversion on Land Use Maps 2, 4 and 5 at such time as an application is submitted and provided that the other objectives and policies of this Plan are met.

2.5 Single wide mobile homes may be permitted in all of the areas designated Urban Residential on Future Land Use Maps 2 and 4 in order to facilitate housing choice within these areas. Consideration should however be given to minimizing the mix of single wide mobile homes and conventional housing in these areas.

2.6 In order to provide a greater diversity of housing choice, the development of a broad range of housing styles, types and densities including affordable, rental and special needs housing which meet the development criteria of this Plan, the level of services and other applicable requirements of the Regional District's Zoning Bylaw will be encouraged in those areas designated Urban Residential and Urban Residential Conversion.

2.7 In order to provide increased opportunity for affordable, rental and special needs housing or amenities on residentially zoned parcels serviced or capable of being serviced with community water and a Provincially approved sewage disposal system, the Regional District will encourage density bonusing in conjunction with a negotiated housing agreement to be registered against the property title in the Land Titles Office.

2.8 Multi-family dwellings shall be permitted within the area designated Urban Residential in the communities of Lower Nicola and Collettville as shown on Land Use Maps 2 and 4), provided they will not adversely affect low density Urban Residential uses. Specific locations will be considered by the Board of Directors at such time as applications for multi-family dwellings are received.

2.9 The Regional District shall encourage, and where necessary for health or safety reasons require, that derelict residential buildings that have been abandoned for any considerable length of time be rehabilitated or demolished.

Mobile Home Park:

2.10 Mobile Home Park development shall be permitted within those areas designated for this use, on Future Land Use Maps 2-4 and 27, provided that due consideration is given to whether the development:

a) has access to a major road, except direct access to a Controlled Access Highway;
b) is adequately buffered as required by the Regional District;
c) is serviced by a community water system;
d) has adequate soils for sewage disposal;
e) meets the necessary floodproofing requirements if within a Provincial floodplain; and
f) complies with the Regional District's Mobile Home Parks Bylaw.

Country Residential:

2.11 Country Residential subdivision and development shall be encouraged to locate in those areas designated Country Residential on Land Use Maps 2, 3, 5 and 6, provided that the subdivision and development:

a) has a minimal impact on existing adjacent land uses;

b) has been approved by the appropriate Provincial agency having authority if within the Agricultural Land Reserve;

c) has access to a major road, except direct access to a Controlled Access Highway;

d) is adequately serviced based on the availability of water;

e) has adequate soils for sewage disposal;

f) is designed to take into account any other environmental factors affecting the development;

g) is planned and developed to take into account the need for fire protection;

h) is designed to maximize efficient land use, and to this end the developer may be required to provide an outline or concept plan indicating such matters as parcel layout, access and servicing on the subject property, as well as potential extensions to adjoining parcels, or such other matters as required by the Regional District.

2.12 The range of parcel sizes for Country Residential development utilizing individual groundwater wells and ground disposal sewage systems shall be 0.8 to 2.0 hectares. The minimum parcel size shall be 0.8 hectares.

2.13 Intensification to urban densities within Country Residential areas shall not be permitted, except within areas designated Country Residential-Urban Residential Conversion on Land Use Maps 2 and 5. Within these Conversion Areas, the intensification to Urban Residential densities shall only be permitted if the area is serviced by a community water system. Further, such intensification or conversion shall be subject to the Urban Residential Policies contained within this Plan.

Rural Residential Development in a Rural Resource Area:

2.14 The minimum parcel size for Rural Residential subdivision and development in a Rural Resource designated area shall be 4.0 hectares.

2.15 Rural Residential subdivision and development of existing parcels within an area designated for Rural Resource purposes on the Land Use Maps 2-7 shall not be permitted, except where the subdivision:

a) will have a minimal impact on the existing or potential agricultural or rural resource use of the parcels involved and adjacent lands;

b) has been approved by the appropriate Provincial agency having authority if within the Agricultural Land Reserve;

c) has access to a major road, except direct access to a Controlled Access Highway;

d) is adequately serviced based on the provision of community water or a groundwater well on each proposed parcel;

e) has adequate soils for on site sewage disposal;

f) is designed to take into account any other environmental factors affecting the development;

g) is planned and developed to take into account the need for fire protection;

h) is designed to maximize efficient land use, and to this end the developer may be required to provide an outline or concept plan indicating such matters as parcel layout, access and servicing on the subject property, as well as potential extensions to adjoining parcels, or such other matters as required by the Regional District.

2.16 A reduction of parcel size may be allowed where, at the date of adoption of the applicable Zoning Bylaw, a parcel is divided by an existing public highway or other major physical barrier and the resulting parcel which includes the entire divided part has a minimum of 0.8 hectares provided it is not affected by the Agricultural Land Reserve whereupon approval of the Provincial agency having authority would be required.

3. RURAL RESOURCE

Objective:

3.0 TO RECOGNIZE AND SUPPORT RURAL RESOURCE ACTIVITIES.

Policies:

3.1 Lands designated for Rural Resource use are shown on Maps 2-5.

3.2 Areas designated as Rural Resource may be used for a variety of activities, including: agricultural, forestry and grazing, recreation, resource extraction and on-site processing, and, park and public use.

Intergovernmental Policy:

3.3 Fencing shall be constructed to a minimum legal standard at the perimeter of any new non-farm development abutting agricultural land and maintained at the cost of the developer or subsequent property owner.

4. COMMERCIAL DEVELOPMENT

Objective:

4.0 TO ENCOURAGE COMMERCIAL ACTIVITIES IN LOCATIONS THAT WILL COMPLEMENT THE CHARACTER OF THE PLAN AREA AND AT A SCALE THAT WILL REFLECT THEIR ROLE IN MEETING THE NEEDS OF LOCAL RESIDENTS AND THE TRAVELLING PUBLIC.

Policies:

4.1 This Plan provides for seven (7) types of Commercial land use:

- Retail Commercial
- Highway Commercial
- Service Commercial
- Tourist Commercial
- Local Commercial
- Temporary Commercial
- Comprehensive Entertainment Commercial

4.2 Recognize the City of Merritt as a sub-regional commercial centre and encourage major commercial uses to locate within its corporate boundaries.

Retail and Service Commercial:

4.3 Commercial development along Highway No. 5A or the Coquihalla Highway will be discouraged in order to achieve a more efficient use of land and to avoid the deterioration of the level of service for regional and interprovincial traffic flows.

4.4 Commercial uses, including those activities of: Retail Commercial and Service Commercial nature shall locate in the areas designated and shown on Maps 2, 4 and 5.

Tourist Commercial:

4.5 Tourist Commercial development to meet the needs of the travelling public may be permitted in the Plan Area and in particular within the area designated as Country Residential on Land Use Map 6, provided that the development:

a) is approved by the appropriate Provincial agency having authority if within the Agricultural Land Reserve;

b) has access to a frontage roadway system, or alternate access by an internal road system;

c) is adequately buffered and/or screened from adjoining land uses by berms, landscaping, fencing or other means deemed appropriate by the Regional District;

d) is adequately serviced based on the availability of water;

e) is located on soils and at a distance from any water body in the area so as to ensure

adequate sewage disposal.

Local Commercial:

4.6 Commercial development which fulfill a local need may be permitted in the following areas:

a) along those areas of Aberdeen Road designated Urban Residential within the community of Lower Nicola;

b) central to the area designated Urban Residential within the community of Collettville;

c) in the area designated Country Residential within the Nicola Townsite. Consideration should be given to the impact of such development on adjacent land uses, access to the area and other relevant objectives and policies of this Plan.

Temporary Commercial Uses:

4.7 The Board of Directors hereby designates the entire Nicola Valley Official Community Plan Area as an area suitable for the issuance of Temporary Commercial Use Permits.

4.8 Temporary Commercial development may be permitted within the Plan Area provided that the development:

a) is not located in an area designated Urban Residential;

b) has access to an internal, frontage or collector road rather than having direct access to a main highway;

c) is adequately served with a supply of potable water and means of sewage disposal;

d) is designed to maximize the efficient use of land;

e) is compatible with surrounding land uses and resource values of the area;

f) has been approved by the appropriate Provincial agency having authority if within the Agricultural Land Reserve;

g) has been approved by the appropriate Provincial agency having authority if it is within 800 metres of a Controlled Access Highway; and

h) complies with all conditions and requirements as may be further specified by the Regional District.

Comprehensive Entertainment Commercial:

4.9 Comprehensive entertainment/recreational complexes may be permitted within the Plan area in suitable locations as shown on Map 7, provided that:

a) the development is adequately serviced, comparable to adjacent municipal standards, including water, sewage disposal, road improvements and drainage.

b) the development is designed to protect the integrity and right-of-way of all elements of the Plan's Major Street Network (as shown on Maps 2-7) and its integration with the City of Merritt's Street Network Plan. Consideration must be given to access, traffic

movement and any necessary road network improvements.

c) appropriate consideration is paid to site development concerns including screening, environmental concerns, wildlife protection, wildfire hazard and unstable soils, subject to the Development Permit guidelines as outlined in Section 16.

5. INDUSTRIAL DEVELOPMENT

Objective:

5.0 TO ENCOURAGE THE CREATION OF NEW EMPLOYMENT OPPORTUNITIES WITHIN THE PLAN AREA WHILE PROTECTING OTHER LAND USES AND THE ENVIRONMENT FROM THE ENCROACHMENT OF INCOMPATIBLE INDUSTRIAL AREAS.

Policies:

5.1 Recognize the City of Merritt as the main industrial centre and encourage Industrial uses to locate within its corporate boundaries.

Industrial:

5.2 Industrial development shall be permitted in those areas designated Industrial on Maps 2, 3, and 7.

5.3 Industrial development in the area designated Future Industrial on Land Use Maps 4 and 7 may be considered at such time as an application is received, provided that it meets the Industrial development criteria set out in Policy 5.4.

5.4 New Industrial development shall be considered where it meets the following development criteria:

a) has access to an internal, frontage or collector road system;

b) has been approved by the appropriate Provincial agency having authority if within the Agricultural Land Reserve;

c) has minimal impact on existing adjacent land uses;

d) is adequately serviced based on the availability of water, the soil's ability to remove nutrients, the type of industrial process to occur, and any other environmental factors affecting the development;

e) recognizes and protects the Coldwater Improvement District's and Lower Nicola Waterworks District community water systems if affected;

f) will not emit substances which would have a detrimental effect on the air or water quality particularly the water quality of Nicola Lake, Nicola River, Coldwater River, Guichon Creek, Godey Creek or Clapperton Creek;

g) will not occur on lands with severe ground disposal sewage limitations unless adequate protection in the form of community sewer or an alternate sewage disposal system, approved by the appropriate Provincial agencies having authority is provided and maintained at the cost of the property owner; and

h) is designed to maximize efficient land use and to this end, the developer may be required to provide an outline or concept plan indicating such matters as landscaping, buffering,

access and servicing of the subject property or any other matters deemed necessary by the Regional District;

Temporary Industrial Uses:

5.5 The Board of Directors hereby designates the entire Nicola Valley Official Community Plan Area as an area suitable for the issuance of Temporary Industrial Use Permits.

5.6 Temporary Industrial development may be permitted within the Plan Area provided that the development:

a) is not located in an area designated Urban Residential;

b) has access to an internal, frontage or collector road rather than having direct access to a main highway;

c) is adequately serviced with a supply of potable water and means of sewage disposal;

d) is designed to maximize the efficient use of land;

e) is compatible with surrounding land uses and resource values of the area;

f) has been approved by the appropriate Provincial agency having authority if within the Agricultural Land Reserve;

g) has been approved by the appropriate Provincial agency having authority if within 800 metres of a Controlled Access Highway; and

h) complies with all conditions and requirements as may be further specified by the Regional District.

6. SAND/GRAVEL RESOURCES AND MINERAL RESOURCES

Objective:

6.0 TO IDENTIFY AND PRESERVE SAND/GRAVEL SOURCES AND MINERAL RESOURCES FOR FUTURE DEVELOPMENT.

Policies:

6.1 The locations of known Sand and Gravel deposits within the Plan Area are identified and shown on Maps 3 and 7.

6.2 Development which would preclude the potential development of Sand/Gravel Resources or Mineral Resources will be discouraged.

6.3 Support the sequential use of land wherein the extraction and processing of Sand/Gravel Resources or Mineral Resources are followed by reclamation for agriculture or other resource use.

Intergovernmental Policies:

6.4 Recognizing that the Regional District does not have direct jurisdiction over the extraction of Sand/Gravel Resources or Mineral Resources, the Board of Directors encourage that the extraction and on-site processing of Sand/Gravel Resources or Mineral Resources be located on lands designated for rural resource, agricultural and/or industrial use within the Plan Area provided suitable noise and dust controls are employed.

6.5 The appropriate Provincial agency having authority should be encouraged to work cooperatively with the Regional District to ensure that the location of Sand/Gravel Resource or Mineral Resource extraction sites, or other site specific industries, within the Plan Area are compatible with other land use activities in the vicinity.

7. AGRICULTURE

Objective:

7.0 TO PRESERVE AGRICULTURAL LAND TO ENSURE PRESENT AND FUTURE FOOD PRODUCTION.

Policies:

7.1 Lands within the Agricultural Land Reserve are included in the Agricultural designation as shown on Maps 2-7.

7.2 Encourage the continued use and preservation of existing or potential agricultural lands within those areas designated Agricultural and Rural Resource on Land Use Maps 2-7.

7.3 Encourage the full utilization of all existing Crown and privately held agricultural land.

7.4 Recognize and retain important stock movement routes through the Plan Area.

7.5 The Board of Directors shall not support applications for exclusion of lands from or subdivision of lands within the Agricultural Land Reserve, unless it is convinced that the land has no significant agricultural potential or unless the Board of Directors is of the opinion that exclusion or subdivision is in the best interests of the community recognizing that final decisions on such applications lie with the appropriate Provincial agency having authority.

Intergovernmental Policies:

7.6 Support and encourage the appropriate Provincial agency having authority to review and update the Agricultural Land Reserve.

7.7 Request fencing be constructed to a minimum legal standard at the perimeter of any new non-farm development abutting agricultural land and maintained at the cost of the developer or subsequent property owner.

7.8 Encourage livestock backgrounding and finishing operations to be located in accordance with suitable siting, physical development and agricultural management practices, such as those guidelines prepared by the appropriate Provincial agencies having authority.

7.9 Reaffirm support for an expanded cooperative program designed to increase public awareness of noxious weeds and the implications of the spread of those weeds.

8. TRANSPORTATION

Objective:

8.0 TO ENSURE AND PROTECT THE EFFECTIVENESS AND EXPANSION POTENTIAL OF THE OVERALL TRANSPORTATION SYSTEM, WHILE ENHANCING SAFE AND EFFICIENT MOVEMENT TO AND WITHIN THE PLAN AREA.

Policies:

8.1 Recognize the Coquihalla Highway as a major trans-provincial highway link with full access control and divided roadway.

8.2 Encourage the development and use of frontage and collector roads to access land rather than providing direct access to a main highway in order to reduce the reliance on the main highway system for short local trips.

8.3 Discourage strip development along major roads and particularly Highway 5A and the Coquihalla Highway in order to achieve a more efficient use of land and to avoid the deterioration of the level of service for regional and interprovincial traffic flows.

8.4 Land uses along highways should be compatible with the noise and speed that are typical of regional traffic using such facilities.

8.5 Avoid offset "T" intersections at all major roads. Cross intersections are preferable and should be properly spaced along highways. The location of at-grade intersections along highways shall be such that passing sight distance is available for highway traffic.

8.6 Require that adequate off-street parking stalls be provided on development sites adjacent to highways and major roads to avoid parking along the road right-of-way.

8.7 Roads, culverts and bridges should be built according to appropriate site-specific specifications in order to avoid damage to watercourses and the fisheries resources.

8.8 The location of roads should be carefully planned to avoid the critical wildlife habitat as identified by the appropriate Provincial agencies having authority. Roads within these areas used by the various user groups should be closed off when they are no longer needed, particularly where those roads hinder the goals of wildlife management.

Intergovernmental Policies:

8.9 Recognize the Major Street Network identified on Maps 2-7, as an essential component of this Plan. Development and subdivision shall be designed to protect the integrity and right-of-way of all elements of this Network and its integration with the City of Merritt's Street Network Plan.

8.10 Encourage the appropriate Provincial agencies having authority to address any adverse impacts of the Coquihalla Highway on land uses within the Plan Area.

8.11 Development within 800 metres of Controlled Access Highways (Highway 5 and 5A) shall be subject to the appropriate provisions of the **Highways Act.**

8.12 Public roads should be constructed according to the design standards of the appropriate Provincial agency having jurisdiction.

8.13 Recognize the City of Merritt Airport as an important regional transportation component.

8.14 Work towards the implementation of suitable zoning regulations to control the location and height of structures adjacent to the City of Merritt Airport which may impair or impinge upon flight paths, sight lines or other operations of the airport.

8.15 In order to maintain the functional integrity of existing pipeline and transmission lines such as BC Hydro, BC Telephone Co. (fiber-optics cable), Westcoast Energy (gas) and the Trans Mountain Pipeline Company (oil), compatible land uses will be designated along and adjacent to these corridors in order to minimize future conflicts.

8.16 Recognize the location of and discourage development within the alignment of the two future 230kV hydro electric power transmission lines identified by the BC Hydro on Land Use Map 7.

9. PUBLIC FACILITY/INSTITUTIONAL

Objective:

9.0 TO PROVIDE FOR THE ESTABLISHMENT OF PUBLIC AND COMMUNITY FACILITIES TO MEET THE REQUIREMENTS OF RESIDENTS WITHIN THE PLAN AREA, TAKING INTO ACCOUNT THE FINANCIAL CAPABILITIES OF THE LOCAL COMMUNITY, REGIONAL DISTRICT, THE RESPECTIVE GOVERNMENT AGENCIES CHARGED WITH ADMINISTERING THOSE NEEDS OR PROVIDED BY A PRIVATE SYSTEM OPERATOR.

Policies:

9.1 Encourage the development and use of Public Facilities and Institutional uses within the City of Merritt to serve the Plan Area.

9.2 Recognize those public and community facilities designated as Institutional or Recreational on Land Use Maps 2-7.

9.3 Development requiring community water shall take into account the capabilities and servicing limitations for the existing community water systems in the area.

9.4 In cooperation with the City of Merritt, residents of Collettville and other affected parties, the Board of Directors will encourage an examination of the feasibility and financial implications of connecting the community of Collettville to the City of Merritt's community sewer and water systems.

9.5 In the absence of a community sewer and treatment system, the density of development within the Lower Nicola and Collettville urban areas shall be limited by the spatial requirements of on-site ground sewage disposal, the soil's ability to treat the sewage and the area's highwater table, and compliance with the minimum parcel size and servicing requirements of the applicable Zoning Bylaw. In addition, ground disposal sewage fields shall be encouraged to locate at least 90 metres from any water course within these areas.

9.6 Provide limited opportunity for privately operated liquid waste facilities provided any such facility is regulated by the appropriate Provincial agency having authority, is approved by any other authority having jurisdiction and complies with the land use requirements of the applicable Zoning Bylaw.

Intergovernmental Policies:

9.7 Recognize all Improvement District groundwater well, surface water intake locations, easement and rights-of-way and provide for the necessary protection of these public utilities/facilities from subdivision, development and potential sources of contamination.

9.8 In cooperation with the City of Merritt, the appropriate Provincial agencies having authority and affected Indian Bands, the Board of Directors will examine all options with respect to refuse disposal within the Plan Area including expansion of the existing Lower Nicola landfill site,

containerized transfer and the possible relocation of the landfill site recognizing the financial capabilities of the Regional District.

9.9 In cooperation with Merritt School District No. 31 examine all options available to expand the current Nicola Canford Elementary School site at such time as development and population growth warrant.

9.10 The Regional District shall regularly consult and cooperate with Merritt School District No. 31 on matters relative to school district planning and needs assessment.

10. WATER RESOURCES

Objective:

10.0 TO RECOGNIZE THE IMPORTANCE OF WATER RESOURCES AND THE NEED TO PROTECT AND IMPROVE THE QUALITY AND QUANTITY OF THOSE RESOURCES FOR FUTURE GENERATIONS.

Policies:

10.1 Subdivision or development that utilize surface water sources that will result in an increased demand for surface water, or that will involve intensification of existing surface water licenses shall be prohibited unless the subdivision or development is serviced by a community water system. This policy is stated with the understanding that existing subdivisions may be developed and that private landowners may continue to benefit from the assets of the property and to enjoy the rights that accrue.

10.2 Individual groundwater wells shall be promoted as the source of water supply for any further subdivision and development unless specified otherwise in this Plan.

10.3 Development utilizing groundwater may be required to provide a report prepared by a Professional Engineer or Groundwater Geologist knowledgeable in hydrogeology stating that the use of such groundwater will not interfere with, intercept, or, otherwise detrimentally affect surface water sources, or groundwater sources utilized by existing developments and agricultural operations.

10.4 Subdivision or development shall be discouraged along the portion of Nicola Lake within the Plan Area if it will have a detrimental impact on the water quality of the lake.

10.5 Encourage ground disposal sewage systems and approved alternate sewage disposal systems to locate a minimum of 90 metres from the highwater mark of any watercourse or waterbody except where a greater distance is recommended in the Management Guidelines of the Lakes Study.

Intergovernmental Policies:

10.6 In cooperation with the appropriate Provincial authorities having authority, the Regional District will encourage the preparation of a groundwater inventory to more accurately determine development potential within the Plan Area and, specifically, those areas which have experienced groundwater problems.

10.7 In cooperation with the appropriate Provincial agency having authority, the Regional District shall recognize the effect of forest practices within and outside the Plan Area on water resources within the Plan Area.

10.8 Development on the foreshore (the area below the natural boundary or highway mark of a waterbody) shall be discouraged without the approval of the appropriate Provincial agency

having authority.

10.9 In order to minimize stream bank erosion, a minimum 15 metre leavestrip of streamside vegetation is to be maintained by the property owner in its natural state adjacent to all watercourses except for the continued agricultural use of those grassed areas which have traditionally been used for grazing purposes and which are not inimical to environmental protection. The leavestrip width in any subdivided parcel which will generally be either 15 or 30 metres will be determined by the appropriate Provincial agency having authority.

11. FISHERIES, WATERFOWL AND WILDLIFE

Objective:

11.0 TO PROTECT AND ENHANCE FISHERIES, WATERFOWL AND WILDLIFE HABITATS.

Policies:

11.1 Encourage the preservation of fisheries, waterfowl and wildlife habitats through controlled disposition of Crown land, and/or subdivision and development of private lands.

11.2 All development shall incorporate soil conservation practices recognizing slope, soil type and precipitation, in order to prevent any increase in the sediment loading of streams and rivers in the Plan Area. In this regard, particular attention should be given to the protection of riparian shoreline or stream bank vegetation and the prevention of unnatural erosion and the discharge of deleterious materials in order to protect fish spawning habitats and migration routes.

Intergovernmental Policies:

11.3 Subdivision of critical deer range and other critical fisheries waterfowl or wildlife habitat, as determined by the appropriate Provincial agencies having authority, shall be discouraged. This policy is stated with the understanding that existing subdivisions may be developed and that private land owners may continue to enjoy and benefit from the assets of the property and rights that accrue.

11.4 Proposals for subdivision or development within the Plan Area that may have an effect on fish, waterfowl or wildlife habitat shall be referred to the appropriate Federal and Provincial agencies having authority for comments and recommendations.

11.5 Encourage the continuation of Federal and Provincial fish stocking and enhancement programs in the Plan Area, particularly for Guichon Creek, and discourage development that may detrimentally affect these programs.

11.6 Development that will alter shoreline or streambanks will be discouraged without the approval of the appropriate Federal and/or Provincial agencies having authority. In this regard, development shall incorporate land management practices designed to protect or enhance shoreline or streambank riparian vegetation.

11.7 Activities involving landfill, diking, channelization or any change to the natural system of watercourses shall be discouraged except where such activities:

a) form part of a riverbank stabilization project designed to prevent significant erosion of agricultural land;

b) have been approved by the appropriate Federal and Provincial agencies having authority.

12. ENVIRONMENTAL CONSTRAINTS

Objective:

12.0 TO RECOGNIZE AND RESPECT THE DEVELOPMENT CONSTRAINTS IMPOSED BY ENVIRONMENTAL FACTORS AND TO ENSURE THAT DEVELOPMENTS IN HAZARDOUS AREAS ARE AVOIDED OR THAT ADEQUATE PRECAUTIONS ARE TAKEN IF DEVELOPMENT IS UNAVOIDABLE.

Policies:

Environmentally Sensitive Areas:

12.1 Within the Plan Area the existence of the following sensitive lands should be recognized:

a) lands which are unsuitable for ground disposal due to tight or restrictive soil conditions;

b) lands which may have potentially unstable soils such as lacustrine silts and bluffs which may be subject to subsidence should the protective overburden be removed.

12.2 Where these conditions exist, development of said lands may be permitted when it can be demonstrated to the Regional District's satisfaction that such uses will not accentuate the sensitive condition. Approval of future development within such areas may be granted subsequent to satisfactory arrangements for sewage disposal, and/or the sub mission of a detailed report certified by a Professional Engineer stating that the use of the land may be carried out safely. Any development which takes place on affected properties shall comply with the recommendations of the engineering report and/or requirements of the appropriate Federal and Provincial agencies having authority.

Hazard Lands:

12.3 Within the Plan Area the existence of the following hazardous conditions should be recognized:

- floodplains;
- streamside, embankments subject to erosion, and fans at the mouths of larger tributaries subject to channel shifting and bank overflow;
- areas prone to debris torrents;
- areas susceptible to rolling or falling rock;
- steep slopes (i.e. slopes in excess of 30%) or areas at the base of steep slopes;

12.4 Prior to development upon or in close proximity to hazard lands, the developer may be required to submit a detailed report certified by a Professional Engineer, in accordance with good engineering practice, to assist the Regional District in assessing the development potential of the lands in question. Any development which takes place on the subject property shall comply with the recommendations of the report and the requirements of the appropriate Federal and Provincial agencies having authority.

Floodplain:

12.5 Support the designation and use of Streamside Preservation Corridors as an environmental resource and water management tool. The corridors designated on the Land Use Maps 2-4, 6 and 7 are based on available floodplain mapping, setback standards as well as the Nicola River Study: River Corridor, and should be revised as more up-to-date or new information becomes available.

Intergovernmental Policies:

12.6 For any development within a floodplain area designated on Maps 2-4 and 6-7, setbacks and elevations for buildings and structures should be established in consultation with the appropriate Provincial agency having authority. Floodplain regulations may also apply to other water bodies and watercourses in the Plan Area which may not be identified.

12.7 Limited development on floodprone areas to parks, open space, recreation or non-intensive agricultural uses. If more intensive development is unavoidable, the Board of Directors will rely on the appropriate Provincial agency having authority to specify the necessary precautions to be taken.

13. RECREATION

Objective:

13.0 TO PROVIDE OUTDOOR RECREATION AND CONSERVATION OPPORTUNITIES WHILE MINIMIZING RECREATIONAL-RESOURCE USE CONFLICTS AND PRESERVING THE RURAL CHARACTER AND ENVIRONMENTAL QUALITY OF THE PLAN AREA.

Policies:

13.1 Recreational lands and existing park sites are designated and shown on Maps 2 and 4.

13.2 At the time of subdivision the Regional District may require the dedication of land for future park purposes in accordance with the requirements of the **Local Government Act**.

13.3 Encourage the retention of unimpeded public access to water-based recreational areas.

13.4 Recognize the abandoned the Kettle Valley Railway right-of-way as potential recreation corridor.

Intergovernmental Policies:

13.5 Cooperate with the appropriate Provincial agencies having authority to promote an expansion of recreational opportunities on Crown lands within and adjacent to the Plan Area where conflict with agricultural uses, wildlife habitats, conservation areas, and residential development may be minimized.

13.6 Cooperate with appropriate Provincial agencies having authority and interest groups in a coordinate effort aimed at increasing public awareness of subjects such as watershed management, stock grazing practices, noxious weed control and factors causing soil erosion in rural areas of the Plan in order to reduce the impact of recreational activities in rural areas.

13.7 Support the proposed Provincial government all-terrain vehicle licencing program, under the **All Terrain Vehicles Act**.

14. HERITAGE CONSERVATION

Objective:

14.0 TO ENCOURAGE AND FACILITATE THE IDENTIFICATION, PROTECTION AND CONSERVATION OF ARCHAEOLOGICAL AND HERITAGE RESOURCES.

Policies:

14.1 Buildings and sites of local historical importance and value within the Plan Area are shown designated Institutional/Heritage on Maps 2, 3 and 6.

14.2 Sites of known archaeological significance within the Plan Area are shown on Maps 2, 3 and 5-7.

14.3 Development that may disrupt, detrimentally alter or destroy valuable historic buildings in the Plan Area shall be discouraged.

14.4 Examine the feasibility and financial implications of incorporating the Heritage Conservation as a function of the Regional District.

Intergovernmental Policies:

14.5 In cooperation with the appropriate Provincial agency having authority and interested local parties, work towards the designation of the following heritage sites:

a) the old Court House Building, Murray Church (United of Canada), and St. John Baptist Anglican Church of Canada within the Nicola Townsite;

b) the Nicola Ranch Ltd. office and residences of historic value also within the Nicola Townsite;

c) the two old Cemeteries in the Lower Nicola area.

14.6 The Regional District recognizes that all archaeological sites are protected under the **Heritage Conservation Act** through designation as Provincial Heritage sites or through automatic protection by virtue of being of particular historic or archaeological value. Development shall not excavate, alter or destroy the archaeological sites identified on Future Land Use Maps 2-7 and those sites which may be discovered by landowners or developers or identified/updated by survey from time to time except where approved through a permit issued under the **Heritage Conservation Act**.

15. IMPLEMENTATION

Objective:

15.0 TO ACHIEVE THE OBJECTIVES OF THIS PLAN, WHILE FOSTERING COOPERATION BETWEEN ALL AGENCIES RESPONSIBLE FOR PLANNING AND LAND USE WITHIN THE PLAN AREA.

Policies:

15.1 Future changes to the applicable Zoning Bylaw shall comply with the objectives and policies of this Plan.

15.2 Amendments to this Plan may be made from time to time to further the development objectives, and/or reflect changing local circumstances.

15.3 Those areas not developed for the uses for which they are designated at the time of adoption of this Plan may continue their current uses until such time that they are proposed for development in accordance with the policies of this Plan.

15.4 The Regional District shall support the objectives, policies and development guidelines of the Coquihalla Highway Corridor Special Planning Study as they relate to the Plan Area.

Intergovernmental Policies:

15.5 The Regional District will take such steps as are necessary, within the time frame of this Plan, in order to assume the subdivision approving function with the Plan Area.

15.6 Encourage greater coordinated land use planning between all Federal and Municipal, Provincial agencies, Improvement Districts and Indian Bands, having authority over land use decisions within and surrounding the Plan boundaries.

15.7 Consult the City of Merritt with respect to land use matters occurring within the Fringe Area as defined within the Fringe Areas Policy Paper.

15.8 In cooperation with the City of Merritt, residents of Collettville and the Coldwater Road areas, the Board of Directors will encourage an examination of the feasibility and financial implications of a municipal boundary extension into these peripheral residential areas.

Approval Process for Development Proposals Contrary to the Plan:

15.9 With respect to development proposal which are contrary to the objectives, policies or land use map designations of this Plan, an amendment to the Plan shall be required before the development proposal can be accommodated. Providing the Board of Directors wishes to proceed with the consideration of such a proposal, an amendment to the Official Community Plan shall involve a change to the relevant policy or land use map designation.

Upon amendment to the Plan, the procedures prescribed in the **Local Government Act** for rezoning and subdivision approval shall apply.

16. DEVELOPMENT PERMIT AREAS

16.1 The Board of Directors, by resolution, may issue Development Permits which can vary or supplement provisions of any bylaw adopted under Division 7 or 11 of Part 26 of the Local Government Act, including:

- zoning;
- parking;
- drainage;
- signs;
- screening; and
- subdivision servicing requirements.

16.2 Development Permits may only be required in areas designated for one or more of the following purposes:

(a) protection of the natural environment, its ecosystems and biological diversity;
(b) protection of development from hazardous conditions;
(c) protection of farming;
(d) revitalization of an area in which a commercial use is permitted;
(e) regulation of the form and character of commercial, industrial or multi family residential development.

Where areas are designated, the special conditions or objectives which justify the designation must be described and guidelines identifying how the conditions will be alleviated and how the objectives will be achieved must be specified.

16.3 The Development Permit Areas, their justification and their guidelines are outlined on the following pages.

Development Permit Area No. One - Coal Hill

Application: Category (a) Protection of the natural environment, its ecosystems and biological diversity.

Category (b) Protection of development from hazardous conditions.

Category (e) Regulation of form and character of commercial, industrial or multi-family residential development.

A Development Permit shall be required prior to any development occurring in the designated area.

Area: Development Permit Area 1 as shown on Map 7.

Justification:

The Development Permit Area is located on Midday Valley Road south of Merritt, BC. Geotechnical analysis has identified a potentially hazardous zone of subsidence related to previous coal mining activity. The area is also subject to possible wildfire occurrences. In addition, a development of this scope may have a significant environmental impact on the surrounding area including wildlife and the Coldwater River. The proposed development will have major traffic implications and careful site planning is needed to ensure that the transportation network functions at a high standard and establishes a positive visual impression for local residents and tourists.

Guidelines:

Development Permits issued in this area shall be in accordance with the following guidelines:

a) An environmental impact assessment will be required and it will ensure that:
- impacts from alteration of drainage patterns are addressed;
- specific dedications for water courses are recommended as applicable;
- specific criteria are developed for the preservation of natural vegetation including trees in all undeveloped and riparian areas;
- impacts to terrestrial wildlife and mitigative strategies are identified;
- mitigative/protective strategies are coordinated with the stormwater management plan;
- specific criteria for sewage disposal are identified;
- measures to minimize discharge to the air of contaminants are identified.

b) A comprehensive stormwater management plan will be required to identify safe and adequate drainage controls.

c) Every application for development shall be accompanied by a geotechnical report prepared by a professional engineer qualified to practice in the field of geotechnical

engineering. The geotechnical report shall:

- define the extent of all surficial geologic materials and location of abandoned underground workings in the area proposed for development;
- define the extent of hazard zones within the area, including the presence of hazardous gases and geothermal warming and identify mitigative measures for explosion potential;
- consider the potential effects of sewage disposal, stormwater or natural drainage and water system construction or irrigation in potential hazards areas; and
- recommend specific criteria for development such that potential hazards are eliminated or accommodated.

d) Stock-proof perimeter fencing and access control to adjacent lands must be provided.

e) Berming, screening and landscaping shall be used to mitigate noise and visual impacts.

f) An assessment should be undertaken to determine the potential for wildfire hazards and identify adequate fire protection measures.

g) Large expanses of parking shall be separated into smaller sections by curbing, light standards, signage, landscaping or a combination of these elements. Dust control measures shall be provided to those unpaved access and parking areas.

h) Lighting shall be directed away from peripheral areas.

i) The site plan must demonstrate the capacity for the safe and efficient movement of people, traffic and emergency vehicles on the site and to and from the site. A comprehensive access and traffic management plan must be completed to the satisfaction of the Ministry of Transportation and Highways and the City of Merritt to ensure that traffic and parking impacts are resolved in an appropriate manner.

Development Permit Area No. Two – Active Mountain:

Application: Category (a) Protection of the natural environment, its ecosystems and biological diversity.

Category (b) Protection of development from hazardous conditions.

A Development Permit shall be required prior to any development occurring in the designated area.

Area: Development Permit Area 2 as shown on Map 7.

Justification:

The Development Permit Area is located between Midday Valley Road and the Kettle Valley Railway Right-of-Way. A geotechnical covenant on the N ½ of Section 4 (Plan E15426) has identified a potentially hazardous zone of subsidence related to a previous garbage disposal site. A development of this scope along the Coldwater River may have a significant environmental impact on the fish and wildlife habitat and natural environment, and also lies partially within the floodplain of the Coldwater River and requires special consideration for that purpose. The proposed developments will have major traffic implications and careful site planning is needed to ensure that the transportation network functions at a high standard. Additional technical analysis is required for the comprehensive entertainment development in conjunction with previous technical requirements identified in Development Permit No. One.

Guidelines:

Development Permits issued in this area shall be in accordance with the following guidelines:

a) An environmental impact assessment will be required and it will ensure that:

- specific guidelines are created for all development to occur in conformity with covenants KL070786, 070791 and 070792;
- specific criteria are developed for the preservation of natural vegetation including trees in all undeveloped and riparian areas;
- impacts to terrestrial wildlife and fish habitat and mitigative strategies are identified;
- mitigative/protective strategies are coordinated with the stormwater and erosion sediment control management plans;
- specific criteria for sewage disposal are identified in accordance with the Waste

Management Act and Municipal Sewage Regulations;

- specific criteria for a water supply in accordance with the BC Safe Drinking Water Regulations.

b) A comprehensive stormwater management plan will be required to identify safe and adequate drainage controls.

c) A comprehensive erosion sediment control plan will be required to address erosion and sediment control and treatment.

d) Every application for development on the North ½ of Section 4 (Plan E15426) shall be accompanied by a geotechnical report prepared by a professional engineer qualified to practice in the field of geotechnical engineering. The geotechnical report shall:

- define the extent of all surficial landfill materials in the area proposed for development;
- define the extent of hazard zones within the area, including the presence of settling, gas generation and any other factors that might affect the suitability of the site for any use;
- consider the potential effects of sewage disposal, stormwater or natural drainage and water system construction or irrigation in potential hazards areas; and
- recommend specific criteria for development such that potential hazards are eliminated or accommodated.

e) Stock-proof perimeter fencing and access control to adjacent lands must be provided.

f) Berming, screening and landscaping shall be used to mitigate noise and visual impacts.

g) An assessment should be undertaken to determine the potential for wildfire hazards and identify adequate fire protection measures.

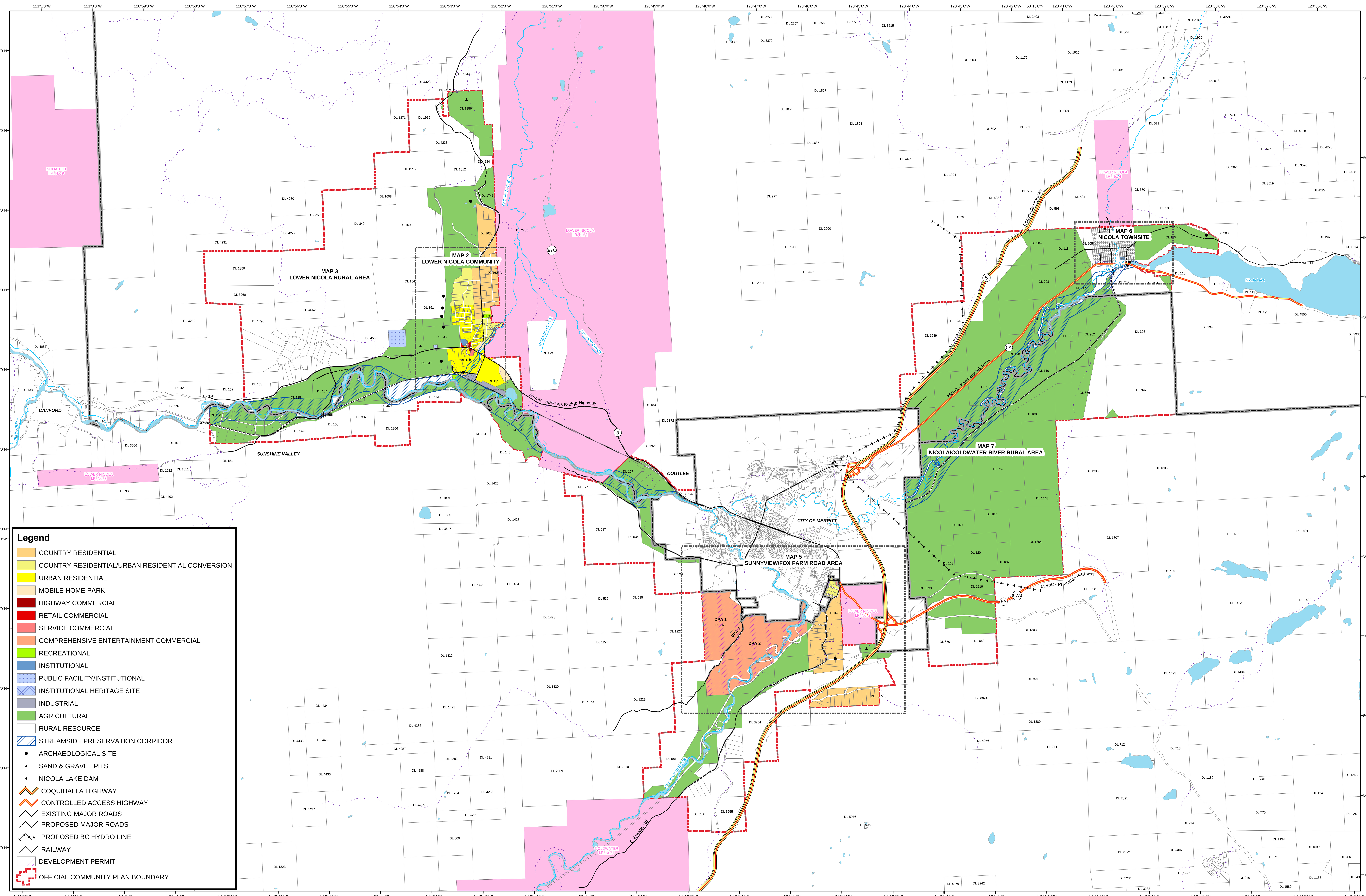
h) Large expanses of parking shall be separated into smaller sections by curbing, light standards, signage, landscaping or a combination of these elements. Dust control measures shall be provided to those unpaved access and parking areas.

i) Lighting shall be directed away from peripheral areas.

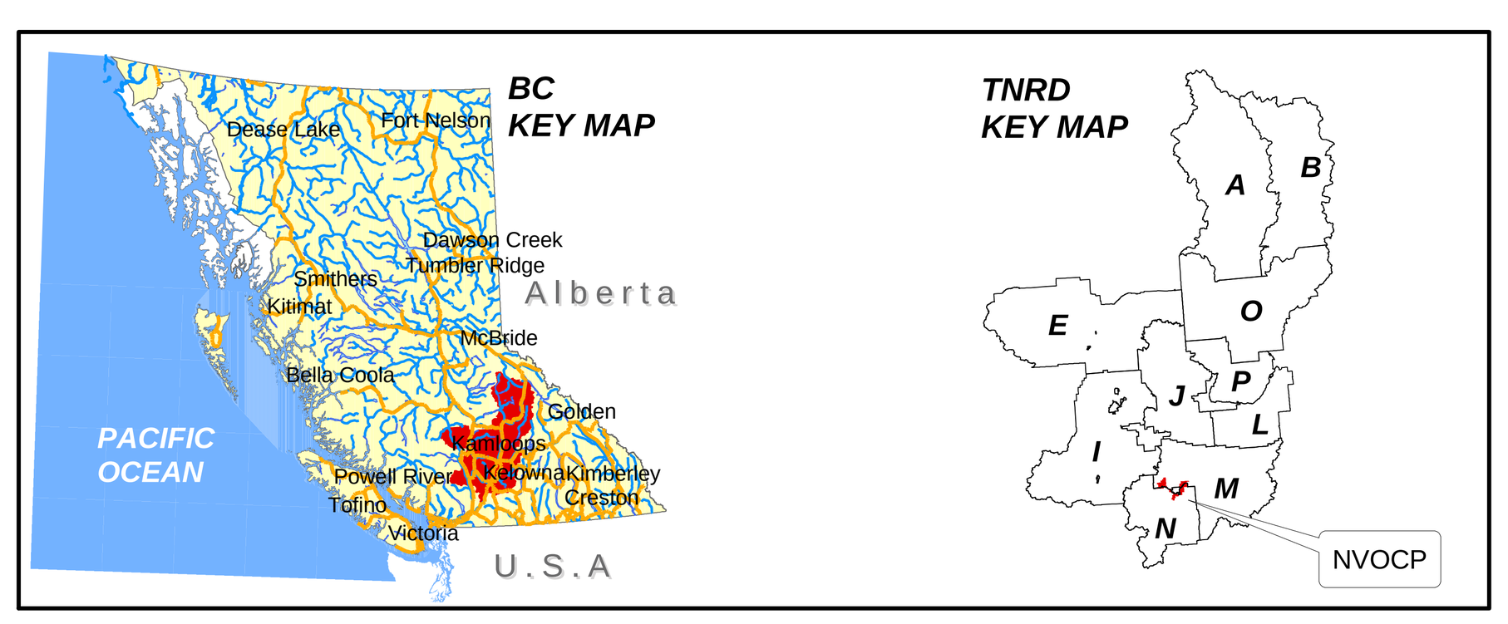
j) The site plan must demonstrate the capacity for the safe and efficient movement of

people, traffic and emergency vehicles on the sites and to and from the sites. A comprehensive access and traffic management plan must be completed to the satisfaction of the Ministry of Transportation and the City of Merritt to ensure that traffic and parking impacts are resolved in an appropriate manner.

NICOLA VALLEY OFFICIAL COMMUNITY PLAN
Schedule "A" of Bylaw No. 1450
MAP 1 - Land Use Key Map



TNRD Administrative Boundary
Parks and Protected Areas of BC
First Nations Reserve
Composite Cadastral
Lakes and Rivers
Rivers and Creeks
Freeway
Highway
Highway Ramp
Arterial
Collector
Local
Gravel Roads
Railway
Hydro Line
Gas Pipeline



THOMPSON-NICOLA REGIONAL DISTRICT

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Development Services Department
Mapping Section
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The information on this map was compiled by the TNRD for regulatory and internal reference purposes only. No representation or warranty is made as to the accuracy of the information.

Projection: Albers Equal Conic
Datum: NAD83
Data Sources:
Fire Protection Service Area - TNRD
Composite Cadastral - TNRD
Administrative Boundary - TNRD
TRIM - Integrated Cadastral Initiative Society (ICIS)
First Nations Reserve - ICIS
Parks and Protected Areas - BC Parks

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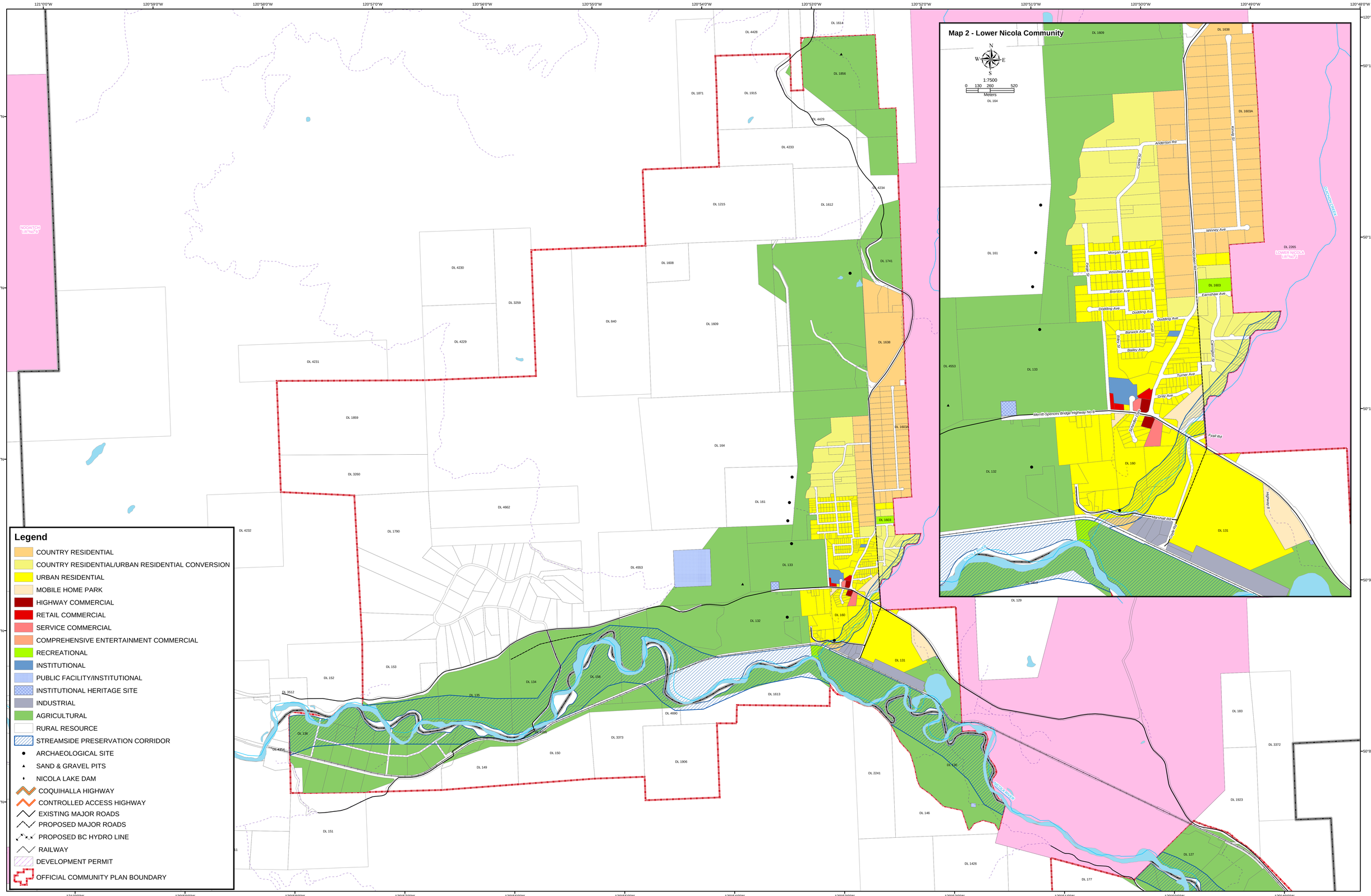
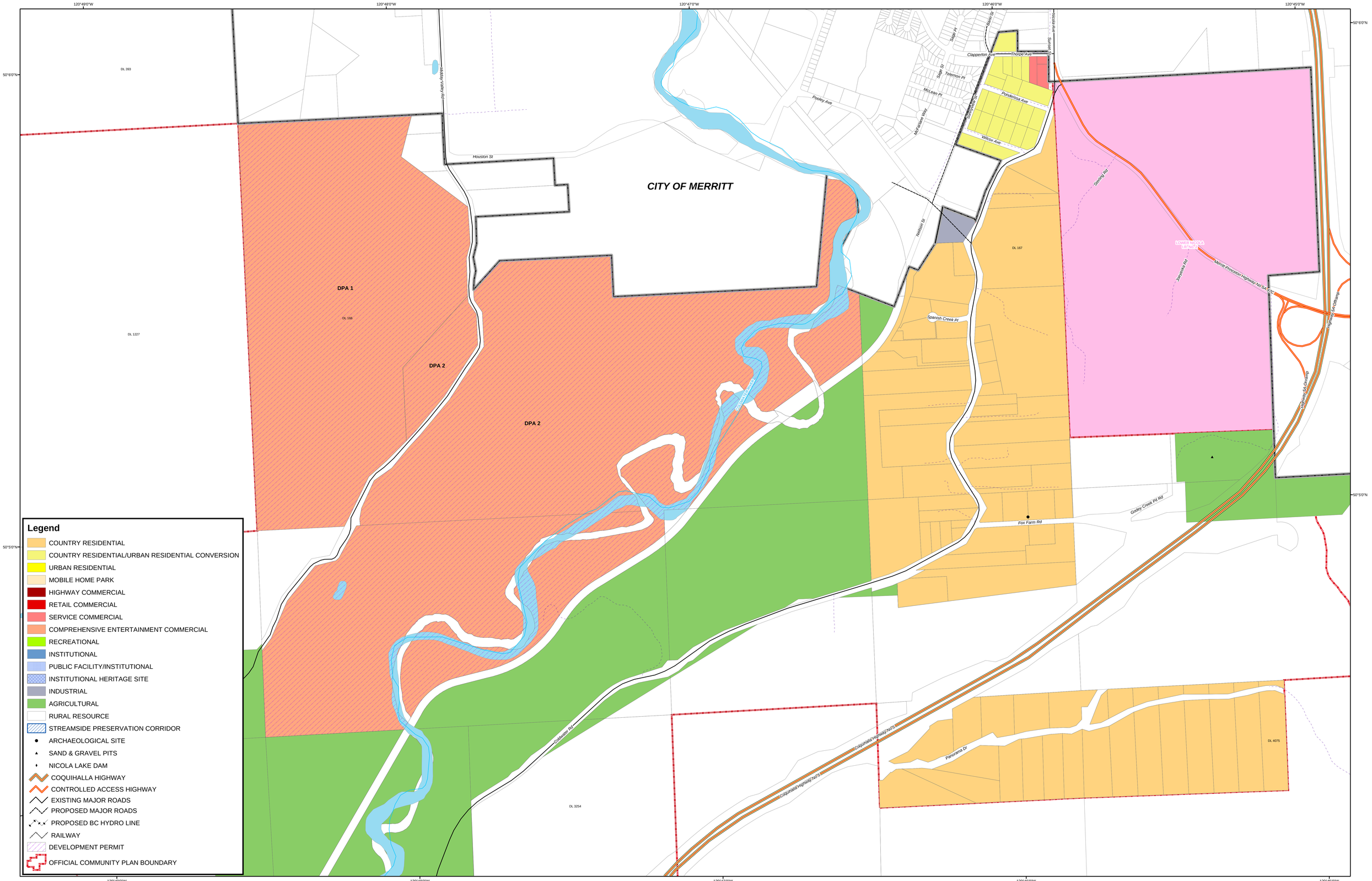
April 11, 2006

NICOLA VALLEY OFFICIAL COMMUNITY PLAN
Schedule "A" of Bylaw No. 1450
MAP 3 - Lower Nicola Rural Area



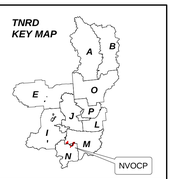
NICOLA VALLEY OFFICIAL COMMUNITY PLAN
Schedule "A" of Bylaw No. 1450
MAP 5 - SUNNEYVIEW/FOX FARM ROAD AREA



Legend

- COUNTRY RESIDENTIAL
- COUNTRY RESIDENTIAL/URBAN RESIDENTIAL CONVERSION
- URBAN RESIDENTIAL
- MOBILE HOME PARK
- HIGHWAY COMMERCIAL
- RETAIL COMMERCIAL
- SERVICE COMMERCIAL
- COMPREHENSIVE ENTERTAINMENT COMMERCIAL
- RECREATIONAL
- INSTITUTIONAL
- PUBLIC FACILITY/INSTITUTIONAL
- INSTITUTIONAL HERITAGE SITE
- INDUSTRIAL
- AGRICULTURAL
- RURAL RESOURCE
- STREAMSIDE PRESERVATION CORRIDOR
- ARCHAEOLOGICAL SITE
- SAND & GRAVEL PITS
- NICOLA LAKE DAM
- COQUIHALLA HIGHWAY
- CONTROLLED ACCESS HIGHWAY
- EXISTING MAJOR ROADS
- PROPOSED MAJOR ROADS
- PROPOSED BC HYDRO LINE
- RAILWAY
- DEVELOPMENT PERMIT
- OFFICIAL COMMUNITY PLAN BOUNDARY

- TNRD Administrative Boundary
- Parks and Protected Areas of BC
- First Nations Reserve
- Composite Cadastral
- Lakes and Rivers
- Rivers and Creeks
- Gravel Roads
- Railway
- Hydro Line
- Gas Pipeline



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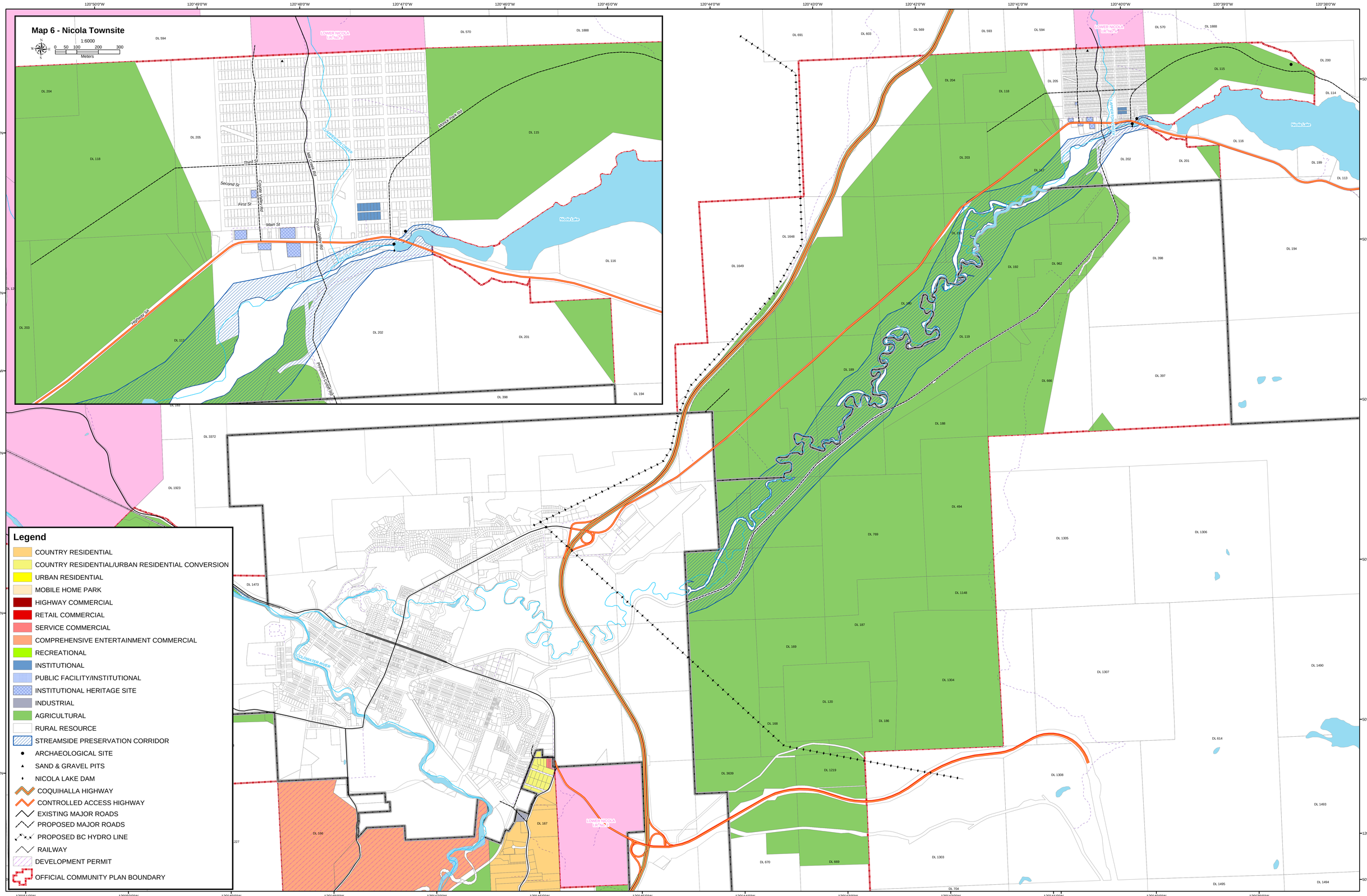
NICOLA VALLEY OFFICIAL COMMUNITY PLAN
Schedule "A" of Bylaw No. 1450
MAP 7 - Nicola/Coldwater River Rural Area



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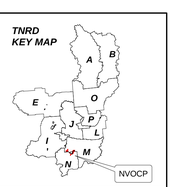

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Parks and Protected Areas - BC Parks

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Kilometers
April 11, 2006

APPENDIX II

Guide to Applying for a Certificate of Public Convenience and Necessity (CPCN)

Water Utilities

Guide to Applying for a Certificate of Public Convenience and Necessity (CPCN)

2007

For more information and for copies of this document, contact:

Utility Regulation Section
Water Stewardship Division, Ministry of Environment
Address: PO Box 9340 Stn Prov Govt
Victoria, BC V8W 9M1
3rd Floor – 395 Waterfront Crescent, Victoria
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Facsimile: 250-953-5124
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Foreword

This guide assists applicants in preparing the information required to support an application for a Certificate of Public Convenience and Necessity.

A Certificate of Public Convenience and Necessity (CPCN) is the document granted by the Comptroller of Water Rights that authorizes a water utility to construct and operate a water system to serve customers within a defined area. The CPCN is granted after a utility has secured a proven source of supply, provided an acceptable system design, and met the required administrative and financial conditions.

The guide is divided into five parts. **Part One** provides general information on water supply agencies in B.C. **Part Two** contains general information on water utilities and the role of the Comptroller of Water Rights. **Part Three** discusses the CPCN and the subdivision approval process. **Part Four** contains detailed information on making a CPCN application. **Part Five** discusses the documentation required after the CPCN has been granted and the construction has been completed.

The Comptroller of Water Rights is responsible for the regulation of water utilities under the *Water Utility Act* and *the Utilities Commission Act*. The Utility Regulation Section of the Water Stewardship Division, MoE delivers to the Comptroller all the necessary information, advice and recommendations required to support approvals, decisions and orders with respect to the utilities regulated.

Although the guide provides substantial detail, it is not intended to explain the requirements for all circumstances specific to a particular utility proposal. It is important that applicants communicate with the staff of the Utility Regulation Section at an early stage in preparing an application.

Part One—
General Information on Water Supply Agencies

1. Types of Water Supply Agencies

There are approximately 980 community water supply systems in British Columbia, each providing water service to at least fifteen customers. About 200 of these systems serve more than 300 customers each. The 980 systems are owned by the following types of agencies:

1. municipalities
2. regional districts
3. improvement districts
4. water users' communities
5. privately owned water utilities
6. small unregulated agencies such as mobile home parks

The numbers[1] mentioned above illustrate the diversity of community water supply in this province: most of the population is served by a few systems owned by the major cities, while most of the systems serve a small portion of the population in rural areas.

In addition to the 980 systems mentioned above, there are about 1440 systems that serve between two and fifteen customers. Except for the smaller utilities, which may serve between five and fifteen lots, they are owned by small unregulated agencies.

2. Water Service in Rural Areas

Unlike urban areas where water service is provided by a municipality, there are a variety of ways in which service is provided in rural areas. Local service areas of regional districts, improvement districts and water utilities serve most of the rural population. However, many homes have individual sources of supply, either wells or intakes in surface sources such as creeks, springs or lakes. There are also many small systems that are not regulated, other than for water quality by the regional health boards.

[1] The data on the numbers of systems was obtained February, 1998, from the Ministry of Health, which is responsible for the potability of supply for all community water systems.

3. Provincial Goals for Rural Service Delivery

The provincial government encourages regional districts to become the primary service providers in rural areas. The goals of this expanded role are to improve linkages between land use and servicing decisions and to achieve efficiency in the provision of rural services by avoiding duplication and the proliferation of small, marginally-viable, independent systems. Local service areas are being created to acquire systems owned by utilities and improvement districts. In some cases local service areas are being created to serve new land developments where no water authorities exist.

Applications for new utilities are referred to regional districts to ensure consistency with servicing plans for a particular area. Regional districts are consulted to determine whether there are alternatives to the creation of a utility and, if not, how the utility can be compatible with the regional district's plans for servicing the general area.

Part Two—
General Information on Water Utilities

4. Water Utilities

A water utility can be an individual or a corporation, but not an agency such as a municipality, regional district, improvement district or water users' community. Briefly, a water utility is defined in the *Water Utility Act* as a person who owns or operates waterworks that serve five or more connections. Refer to the Act for a complete definition or for any question about the definition of a water utility.

Water utilities are normally created to serve rural land development where community water service is required and no water service agencies exist. They are usually created by land developers who have no other option to obtaining subdivision approval. There are approximately 175 utilities in the province that serve some 20,000 households.

Water utilities primarily serve fee simple subdivisions. They also serve strata developments and various other developments found in places such as ski resorts.

5. Role of Comptroller of Water Rights

Under the *Water Utility Act* and the *Utilities Commission Act*, the Comptroller of Water Rights (Comptroller) is responsible for the regulation of water utilities. The Comptroller may appoint a Deputy Comptroller who will have the same authority as the Comptroller for decision making purposed under both these acts. This regulatory responsibility falls into two major categories: 1) to assure that water systems installed by land developers are properly designed and constructed, and 2) to assure that the customers of utilities receive acceptable water service at reasonable rates.

The Comptroller is also responsible for approval of subdivisions under the regulations to the *Local Services Act*. Where a water utility serves a subdivision, the system or extension is approved by the Comptroller before the subdivision can be registered.

Regulation of strata developments where the strata corporation owns the water system is different from the regulation of other utilities. For these developments the Comptroller is responsible for approval of design and construction of the water system and not for the ongoing regulation of the

strata corporation. The strata corporation may apply for exemption from regulation after more than 50% of the lots are sold because the customers of the utility, the strata lot owners, elect the strata council that administers the affairs of the strata corporation. As strata corporations are governed under *the Strata Property Act*, the exemption from regulation avoids legislative overlap with the *Utilities Commission Act*.

6. Forms of Organization

Because most utilities are created by land developers, the most common form of organization is a company incorporated under the *Company Act*. Other forms of organization are:

1. an individual
2. a partnership registered with the Registrar of Companies in accordance with *the Partnership Act*
3. a society incorporated under the *Society Act*
4. a strata corporation incorporated under the *Strata Property Act*

7. Duties and Responsibilities

The *Utilities Commission Act* lists the duties, responsibilities and restraints imposed upon a water utility. Some of these include, but are not limited to, the following:

1. No person shall begin the construction or operation of any utility plant or equipment without first obtaining a Certificate of Public Convenience and Necessity. (Sec. 45)
2. A water utility shall furnish a service that is adequate, safe and reasonable. (Sec. 38)
3. No water utility shall cease operation without permission. (Sec. 41)
4. A water utility shall obey the orders of the Comptroller. (Sec. 42)
5. A water utility shall provide information and complete and return forms required by the Comptroller. (Sec. 43)
6. A water utility shall have an office in British Columbia in which all its accounts and records shall be kept. (Sec. 44)
7. A water utility shall not borrow, unless payable within one year, or guarantee payment of a loan, without first obtaining approval. (Sec. 50)
8. A water utility shall not dispose of its property without first obtaining the approval of the Comptroller. (Sec. 52)

9. A water utility shall not consolidate, amalgamate or merge with another person (or corporation), or permit the transfer of its shares to another person without first obtaining approval. (Sec. 53 and 54)
10. The Comptroller may require a water utility to create and maintain a reserve fund. (Sec. 57)
11. The only rates that can be charged by a utility are those approved by the Comptroller. (Sec. 61)

8. Financing and Viability

A utility to be a viable business entity and provide adequate service to its customers, needs to obtain adequate revenues to pay operating costs and provide for replacement of system components. Because the utility will have few, if any, customers initially, revenues will not be adequate. To achieve a minimum level of viability, developers are expected to subsidize the operation until there are enough rate-paying customers for the utility to become self-sufficient. The subsidy may be perpetual for small utilities. This subsidy may include undertakings by the developer to donate time and resources, and cash deposited into a Revenue Deficit Reserve Fund.

Experience has shown that, in general, utilities of fewer than twenty customers are not viable. Therefore, even if an applicant for such a small utility was to propose a large Revenue Deficit Reserve Fund, demonstrating viability would be extremely difficult. Because strata corporations are not regulated on an ongoing basis, as discussed previously, this viability issue may not apply to single phase strata subdivisions.

9. Tariffs

A tariff is the utility's document that describes the regulations and conditions under which a customer obtains service and the schedule of applicable rates. A proposed tariff should be submitted before a CPCN is granted. A copy of a suggested tariff will be provided after the CPCN application is initially reviewed. A copy may be downloaded from our web site at: www.env.gov.bc.ca/wsd/water_rights/water_utilities/

10. Reporting Requirements

Utilities need to report annually to the Comptroller on their activities. The reports include such information as financial statements, reserve fund activities, system operation and maintenance and number of customers.

Part Three—
Certificate of Public Convenience and Necessity

11. What is a CPCN?

A Certificate of Public Convenience and Necessity is granted by the Comptroller to authorize a utility to construct and operate works and to provide water service to customers within a specified area. It describes the conditions under which the utility is established and under which it will operate. The process of granting a CPCN is designed to coordinate with the subdivision approval process. A CPCN (in the case of a new system) or an amendment to a CPCN (in the case of an extension to an existing utility) authorizes a utility to serve the specific subdivision that is to be approved for registration by the Approving Officer.

12. Subdivision Approval Process

Under *the Land Title Act*, the Approving Officer ensures that all requirements of agencies having jurisdiction over any aspect of a subdivision are satisfactorily completed prior to allowing registration of the subdivision in the Land Registry office. In rural areas the Ministry of Transportation performs the role of approving officer. There is a Provincial Approving Officer in each of the Highways Regional offices.

Subdivision applications are received by the District Highways office, which refers the application to all agencies that may have an interest in the proposed development. Such agencies would include, but not be limited to: the Water Stewardship Division, MoE, the Regional Health Board and the Regional District. These agencies make their requirements known to the District Highways office, and if they receive no objections, they send a report recommending preliminary approval to the Approving Officer. The Approving Officer lists the requirements in a document called a “Preliminary Layout Approval”.

Where a proposed subdivision is to be served by a water utility, the Preliminary Layout Approval will typically include in its list of requirements a statement such as “a Certificate of Public Convenience and Necessity and approved as-built drawings”.

The approval process of the water system begins with an application for a CPCN by the person who intends to provide water service. The engineering drawings and other technical information are reviewed to ensure that the source of supply is adequate and that the proposed works are suitably designed. Administrative and financial information is reviewed to ensure that the utility will be a viable operation that can serve its customers in the long term. The CPCN is granted when all requirements have been met. It approves the source of supply and the system design, lists the conditions under which the utility will operate and authorizes the utility to proceed with construction.

After the work has been completed, the utility's engineer prepares as-built drawings of the system and certifies that the construction has been satisfactorily completed. Upon acceptance of the as-built drawings and completion of any other outstanding requirements, the Comptroller will notify the Approving Officer that, with respect to the Comptroller's requirements, the registration of the subdivision is in order.

The Comptroller's office communicates with a number of other agencies while reviewing a CPCN application. It coordinates with regional districts to ensure compatibility with plans that may be in place for servicing a general area and with subdivision servicing by-laws.

Regional Health Boards have a responsibility for community water systems under the *Drinking Water Protection Act*. System designs must be approved by the local public health engineer prior to construction. The Comptroller's technical staff work with the local public health engineer on matters related to the potability of the source and the proposed treatment works.

For systems using groundwater, the Groundwater Section, Water Stewardship Division, MoE reviews the information on the proposed well. For systems using surface water, regional offices of LWBC are contacted regarding water licence applications. Appendix 8 provides the address and phone number of each regional office.

13. CPCN Application–Scope of Review and Financial Requirements

The CPCN application is reviewed to ensure that the water system proposed is suitably designed to provide adequate service and that the utility will be a viable business operation.

13.1 Contributions in Aid of Construction

Building a utility plant to serve an area having no customers initially and financing that plant to receive a return on investment is clearly uneconomic.

Construction may be feasible, however, if the person or company who benefits from the construction is prepared to contribute (with no expectation of a return on investment) the entire cost of installing the necessary waterworks. For that reason, it is a widely accepted practice for real estate developers to contribute to the utility the cost of constructing the waterworks to serve the land they wish to market as serviced lots.

13.2 New Utilities

The first consideration in reviewing an application for a new utility is determining whether it is in the public interest to approve the creation of a new water authority. This involves determining whether there are other local government options to providing water service.

Another important aspect in the review of an application for a new utility is the assessment of the financial requirements for a viable operation. This involves, among other things, determining the amount of money required to be deposited in reserve funds.

A viable utility must be able to obtain sufficient revenue to pay operating and maintenance costs and make provision for the replacement of system components to be able to provide reliable service in the long term. Small private water utilities usually do not have the ability to finance replacement of the major system components when required. Therefore, a portion of revenues is set aside into a Replacement Reserve Fund.

Utilities normally obtain revenue from customers through its approved service rates and from owners of unconnected lots through an availability of service charge. The latter charges are generally set at 50 to 70% of user rates and are required to cover the cost of keeping the water system operable so that service is available upon application. During the initial years of operation, revenue is usually insufficient to cover the cost of operation and provide for future replacement. Therefore, a condition of granting a CPCN may be the establishment of a Revenue Deficit Trust Reserve (RDRF) to generate interest earning to cover revenue shortfalls.

To ensure that customers and vacant property owners are not subject to unnecessarily high rates, limits are set on approved rates. In some cases this may result in revenue deficits and increases in the RDRF requirements and/or continues subsidization by the utility owners.

For Strata Corporations the financial requirements will depend on certain circumstances, such as whether or not it is a phased development. Tariffs and annual provision for replacement will not be required because the costs of running the water utility are usually absorbed within the annual strata fees set by the strata corporation, in accordance with the *Strata Property Act*. To provide some measure of viability, particularly in the early years when there

are few if any customers, a minimum of either $50,000 or two years' approved operation, maintenance and general expenses is generally required. After a strata council is formed and more than 50% of the lots are sold, the utility may apply for exemption from regulation. At that time, the Comptroller may release the Revenue Deficit Reserve Fund to its beneficial owner.

In any case, at an early stage of making the CPCN application, the developer or its agent should contact the Utility Regulation Section, Water Management Branch in Victoria to clarify the requirements under various scenarios.

13.3 Existing Utilities

Applications for extensions to existing utilities are reviewed primarily to determine the adequacy of the existing systems and what works are required to serve the new development without adversely affecting existing customers. For relatively small extensions, capital contributions may be collected from applicants to allow utilities to construct additional capacity in the future. These contributions will be held in a Deferred Capacity Reserve Fund. As in the case of new utilities, availability of service charges is required. There may also be some additional financial requirements related to the viability of the extension in cases where the costs of operating the extension are high.

14. Sources of Supply

14.1 Surface Water

Under the *Water Act* the Crown owns all surface water in the province. Applicants for a CPCN who intend to use a surface water source must apply separately for a water licence. General information on water law and application forms is available from the regional Water Stewardship Division offices, listed in Appendix 8.

The CPCN will not be issued until the Comptroller receives confirmation that a water licence will be granted. Since the water licensing process involves an investigation of the source and of existing water rights, an early application for a water licence is advisable to minimize delays. In some circumstances, application for a water licence may involve confirmation by a professional hydrologist that water is available from the proposed source. Where a development is planned to proceed in stages, consideration must be given to future availability of surface water as the water licence is granted for only one stage at a time.

14.2 Groundwater

Where groundwater is to be the source of supply, the application should include a report prepared by a professional hydrogeologist or a professional engineer experienced in groundwater. Detailed information, policies and procedures are contained in “Community Water Supply Wells—Guidelines for Groundwater Reports and Well Testing” (see Appendix 9). The guidelines are intended to assist the geologist or engineer in obtaining and presenting sufficient data to establish the characteristics of the groundwater aquifer and the safe yield of the well.

15. System Design

Design and construction supervision is carried out by a professional engineer or limited licensee experienced in the waterworks industry. The terms of reference under which the engineer is hired by the developer or utility should specify that this person is responsible for both the design and construction supervision of the system or extension.

A publication entitled “Design Guidelines for Rural Residential Community Water Systems, 2007“ has been prepared by the Comptroller’s office and is available to the utility’s or developer’s engineer. The guidelines present the minimum acceptable standards. They are not intended to limit the engineer in designing to a higher standard. The guidelines booklet provides further information on the role of the engineer.

Part Four—
Details for Making a CPCN Application

This section of the guide provides a detailed description of the documentation and other information required to support an application. The information generally pertains to all applications; however, other information may be required, depending on the circumstances of the particular application.

For extensions to existing utilities, the organizational information on the utility will be on file. Therefore, unless there are changes, that information is not required. Depending on the nature of the extension, some of the information provided here may not be required.

16. Method of Application

An application for a CPCN should include:

a. A completed application form (See Appendix 1.)

b. The items shown on the check list (See Appendix 2.)

c. A covering letter, one complete set of supporting documents and one set of engineering drawings and specifications, to be sent to:

Deputy Comptroller of Water Rights,
Water Stewardship Division, MoE
PO Box 9340 Stn Prov Govt
Victoria BC V8W 9M1

d. Signature by an appropriate agent

The application form should be signed by an officer of the applicant or by its authorized agent who is empowered to act in all matters arising between the applicant and the Comptroller's office. Include a letter from the applicant showing the delegation of authority.

e. A cheque made payable to the Minister of Finance for the application fee.

17. Check List

The following is a list of items required in support of an application for a CPCN. A copy is attached as Appendix 2. See the following section for further explanation of the items.

1. Water utility organization details
2. Certificate of Incorporation
3. Description of proposed development to be served
4. Key plan and service area
5. Source of supply
6. Design brief
7. Engineering specifications and drawings
   List drawings and provide name of consulting engineer.
8. Engineering supervision
9. Statutory rights of way over private property and permits over Crown land
10. Estimated construction cost, annual revenue and expenses
11. Corporate structure and financing
12. Notice of application
13. Approvals by or agreements with other authorities
14. Application fee

18. Explanation of the Check List Items

18.1 Water Utility Organization Details

An applicant for a CPCN should preferably be a company registered under the *Company Act* and have a registered office located in British Columbia. Accounts and affairs of the proposed utility are to be strictly segregated from other business endeavours and be separately recorded. In some circumstances, the Comptroller may require a separate water utility company to deal exclusively with the affairs of the water service enterprise.

The utility (and/or its shareholders) retains ownership and control of the waterworks until the Comptroller is satisfied that the public interest will not be adversely affected by a transfer of ownership and/or control. Automatic transfer of ownership to the lot purchasers or others is not acceptable.

For strata developments where the water system will be transferred to the strata corporation, a CPCN is granted to a company created by the developer. The strata corporation does not exist until the strata subdivision is registered. After registration, the Comptroller may approve the transfer of the system to the strata corporation. The strata corporation may eventually be made exempt from regulation once the strata council has been formed and any other requirements met.

18.2 Certificate of Incorporation

Submit a copy of the Certificate of Incorporation of the company.

18.3 Description of Proposed Development

The description of the proposed development to be served should include information such as the number of lots, type of development (i.e., fee simple subdivision, strata) and phasing.

18.4 Key Plan and Service Area

Submit one copy of a key plan showing the location of the proposed service area in relation to existing gazetted roads, lakes and the boundaries of any municipality in the vicinity. Prepare the plan on a legal composite base.

Include a legal description of all lands to be served. For development of a subdivision in phases or stages (including a strata title) provide an overall plan showing an outline of the anticipated ultimate development.

18.5 Source of Supply

a. Surface Water

If proposing to take a supply of water from a stream, lake or spring, provide assurance that a water licence can be obtained. Submit a copy of the water licence application with the CPCN application. A hydrology study by a professional hydrologist may be required to confirm water availability from the proposed source. Refer to Part Three–section 4 of this guide.

b. Groundwater

Submit two copies of a report prepared by a groundwater geologist or professional engineer experienced in groundwater if groundwater (wells) is to be used as a source of supply. Refer to Part Three–section 4 and Appendix 9 of this guide.

18.6 Design Brief

The engineer should provide a brief that conceptually describes the proposed water system. The brief should include customer demands, fire protection provisions, the capacity and characteristics of the source, the capacity and features of major system components and a description of system operation including the control system.

18.7 Engineering Specifications and Drawings

Submit one complete set of detailed design drawings of the proposed waterworks, signed and sealed by the engineer. The drawings should show plan views, elevations, sections and details, which, together with the specifications, provide the information necessary to construct the works. The system layout drawings should be on a legal composite base and show contours, elevations of key components, pressure zones and sizes of pipelines. A publication entitled “Design Guidelines for Rural Residential Community Water Systems, 2007” provides further information on the design of systems. It is available from the Utility Regulation Section in Victoria to the utility’s engineer.

18.8 Engineering Supervision

The engineer should provide confirmation that he/she has been hired to design and inspect construction in a manner that is adequate to prepare as-built drawings and certify the satisfactory completion and operation of the works.

18.9 Statutory Rights of Way Over Private Property and Permits Over Crown Land

Obtain registered statutory rights of way where pipelines and other waterworks components will be located on private property. The Comptroller must be satisfactorily assured that the utility will be allowed to operate and maintain all plant so located. Provide evidence that a permit has been (or will be) issued for the location of waterworks within public rights of way or over Crown land.

18.10 Construction Cost, Annual Revenue and Expenses

Submit estimates of construction cost and annual revenue and expenses. (See Appendix 3 and 4)

18.11 Corporate Structure and Financing

Include a letter of undertaking from the developer to contribute, with no expectation of a return on investment, the entire cost of the waterworks system. A sample letter is attached as Appendix 5.

Secure payment to the utility of the availability of service charge for unconnected lots by registering a rent charge agreement against the title of each lot in the service area. Details on the registration of a rent charge agreement are attached as Appendix 6.

18.12 Notice of Application

Advertise notice of the application for a CPCN in at least one edition of a widely circulated newspaper in the area of the proposed utility. Allow

a 30 day period to permit any objections or submissions to reach the Comptroller. Forward a copy of the newspaper tear sheet to the Comptroller to verify publication of the advertisement. A sample form of advertisement is attached as Appendix 7.

18.13 Approvals by or Agreements with Other Authorities

a. Utilities Located Within Municipalities

Where a water utility intends to operate within the boundaries of a municipality or other public authority that provides water service, provide an agreement with that authority that establishes the conditions under which the utility will provide water service within its authorized service area. The agreement is subject to the approval of the Comptroller.

b. Health Approval

Provide a copy of the Construction Permit issued by the local public health engineer pursuant to ***the Drinking Water Protection Act***. Consult the local regional health authority for details.

c. Highways Approval

Provide a copy of the Preliminary Layout Approval issued by the Approving Officer.

Where pipelines or other works are located within a road, provide a copy of the application to occupy the road right of way.

18.14 Application Fee

The application fee for a CPCN is set by Cabinet through Order in Council. The current application fee is $50.00. Please make your cheque payable to **Minister of Finance**.

Part Five—
Documents Required After the CPCN has been Granted

After the CPCN has been granted and the construction of the works has been completed and tested, submit the following documents.

19. As-Built Drawings

After completion and testing of the constructed waterworks, submit one copy of the as-built drawings to the Comptroller. The drawings shall bear the seal and signature of the engineer. They should be accompanied by a statement by the engineer to the effect that the works are correctly portrayed by the as-built drawings, are substantially the same as the design which was approved by the Comptroller and the works have been tested and operate satisfactorily as designed.

Upon acceptance of the as-built drawings and the completion of all other requirements, the Comptroller will provide the Approving Officer with notification that registration of the subdivision is in order.

20. Registered Plans

Submit one copy of the registered subdivision plans to the Comptroller as soon as they are available.

21. Statutory Rights of Way

Submit one copy of all registered statutory rights of way required for works located on private property to the Comptroller as soon as they are available.

22. Waterworks Superintendent

Advise the Comptroller of the name, address and telephone number of the person hired to be responsible for the operation and maintenance of the water system. The waterworks superintendent should be conversant with the operation and maintenance of water systems, and should be able to respond promptly to any malfunction of the system. It is the responsibility of the utility

to advise the Comptroller of any change in appointment of the waterworks supervisor, address and telephone number.

23. Cost of Constructed Works

The utility should provide a breakdown of the actual cost of the constructed water system. This information is important for determining the replacement provision, for reserve fund requirements and for rate setting purposes.

Appendix 1. Application for Certificate of Public Convenience and Necessity

(Water *Utility Act* and *Utilities Commission Act*)

I (We),

.....
(Name of Applicant)

of .....

.....
(Address of Applicant)

hereby make application to the Comptroller of Water Rights of the Province of British Columbia for a Certificate of Public Convenience and Necessity to construct and operate a public utility to supply water service in

.....

.....

.....
(Legal description of area to be supplied)

I (We) have read the Guide to Applicants for a Certificate of Public Convenience and Necessity under the *Water Utility Act* and enclose information itemized on the check list.

.....
(Applicant)

By .....
(Authorized Agent)

.....
(Address of Agent)

.....
(Telephone and Fax of Agent)

Date .....

Appendix 2. Check List Items Enclosed with Application for a Certificate of Public Convenience and Necessity

Check when all information is at hand.

	Item	*Check*
1.	Water utility organization details	_____
2.	Certificate of Incorporation	_____
3.	Description of proposed development	_____
4.	Key plan and service area	_____
5.	Source of supply	_____
6.	Design brief	_____
7.	Engineering specifications and drawings	_____

.....

.....

.....

.....

(List drawings)

by .....

.....

(Name and address of consulting engineer)

8.	Engineering supervision	_____
9.	Statutory rights of way over private property and permits over Crown land	_____
10.	Construction cost, annual revenue and expenses	_____
11.	Corporate structure and financing	_____
12.	Notice of application	_____
13.	Approvals by or agreements with other public authorities	_____
14.	Application fee	_____

For an explanation of these items, refer to the paragraph of the same number in Part Four, section 18 of this guide.

Appendix 3. Estimated Construction Costs

1.	**Intangible Plant**	
	Organization	_____
	Franchises and consents	_____
	Miscellaneous and intangible plant	_____
2.	**Source of Supply**	
	Land and land rights	_____
	Structures and improvements	_____
	Reservoirs	_____
	Lake, stream or spring intakes	_____
	Wells	_____
	Supply mains	_____
3.	**Pumping Plant**	
	Land and land rights	_____
	Structures and improvements	_____
	Electrical pumping equipment	_____
	Other pumping equipment	_____
4.	**Water Treatment Plant**	
	Land and land rights	_____
	Structures and improvements	_____
	Water treatment equipment	_____
5.	**Transmission and Distribution Plant**	
	Land and land rights	_____
	Structures and improvements	_____
	Distribution reservoirs	_____
	Transmission and distribution mains	_____
	Services	_____
	Hydrants and standpipes	_____
6.	**General Plant**	
	Land and land rights	_____
	Structures and improvements	_____
	Office equipment and furniture	_____
	Transportation equipment	_____
	Other general equipment	_____
TOTAL PLANT		═══

Appendix 4. Sample Utility Company Projected Income Statements

	When 5 lots connected	When all lots connected	
User Rate Per Month			Includes RRTF provision
Annual Rent Charge			
RRF* Contribution			
Estimated Number of Homes Connected	5		
Remaining Rent Charge Lots		0	
Operating Revenue			
User Rates			
Rent Charge Income			
Interest Income on RDRF*			Based on 1 yr. GIC rates
TOTAL REVENUE			
Expenses			
Operating and Maintenance:			
Operator's Salary			
Power			
Chemicals			
Repairs and Maintenance			
General Expenses:			
Accounting and Legal			
Billing and Bookkeeping			
Insurance			
Management Fee			
Miscellaneous			
Office Supplies and Postage			
Replacement Reserve Provision			
TOTAL EXPENSES			
NET INCOME			

*RRF = Replacement Reserve Fund
*RDRF = Revenue Deficit Reserve Fund

Appendix 5. Sample Letter of Contribution

XYZ Utility Ltd
123 Avenue
Wellsprings BC V3V 3V3

We hereby contribute, with no expectation of a return on investment, the waterworks required for the provision of water service to the proposed subdivision of (*describe development here*).

Yours truly,

ABC Developments Ltd.

cc: Comptroller of Water Rights

Appendix 6. Registration of Rent Charge Agreement

1. A registered rent charge will ensure that the utility derives adequate revenue for making service available to unimproved lots. A rent charge agreement is a contract between the utility and the property owner for the purpose of ensuring the economic viability of the utility. It requires the approval of the Comptroller as a condition to granting a Certificate of Public Convenience and Necessity.
2. A rent charge document will be registered at the Land Title Office, and therefore is not a document to be treated casually. The sample form of document provided by the Comptroller is *pro forma*; it is not a form with blanks to be filled in. The rent charge document should preferably be prepared by the land developer's solicitor, and should certainly be reviewed by the utility's solicitor before being presented to the Comptroller for approval.
3. A rent charge must effectively be a first lien on the subject property as against any other charges. The charge abates when a lot owner becomes a rate paying water user, but the registered document is not extinguished thereby.
4. The terms and conditions of the agreement should ensure the collection of the charge, and not to provide a means for lot owners to finance their property at the expense of the utility. Therefore, interest rates stipulated by the agreement should be punitive, and the right of the utility to recover any default should not be lenient. At the same time the agreement should not provide an opportunity for the utility to take undue advantage of a default resulting from simple inadvertence.
5. In the case of a proposed subdivision, a rent charge may need to be registered on the parent parcel. Upon registration of the subdivision, the rent charge agreement will appear on the title of each individual lot. For existing utilities, extensions to individual existing lots will require a rent charge registered on each title.
6. A *pro forma* rent charge agreement is available on request.

Appendix 7. Notice of Application

.....
(Name of Applicant)

NOTICE OF APPLICATION TO THE COMPTROLLER OF WATER RIGHTS
UNDER THE *WATER UTILITY ACT* AND
THE *UTILITIES COMMISSION ACT*

NOTICE is hereby given by .....
(Name of Applicant)
that an application has been made to the Comptroller of Water Rights for a Certificate of Public Convenience and Necessity for the proposed construction and operation of a waterworks distribution system to serve residents in the area of

.....

.....
(Legal description of area to be served)

.....

.....

Any person wishing further information in connection with this application should apply directly to

.....
(Name and Address of Applicant)

Any objections to this application are to be forwarded to the Deputy Comptroller of Water Rights*, Water Utility Act*, PO Box 9340 Stn Prov Govt, Victoria B.C. V8W 9M1, to be received by the Deputy Comptroller on or before:

.....
(A date which will allow a period of at least thirty days from date of publication)

.....
(Name of Utility)

.....
(Signature of Applicant or Authorized Agent)

Appendix 8. Water Stewardship Division, MoE Regional Offices

1.	Vancouver Island	Regional Water Manager Water Stewardship Division, MoE 2080 Labieux Rd. Nanaimo BC V9T 6J9	Phone: 250-751-3100 Fax: 250-751-3103
2.	Lower Mainland	Regional Water Manager Water Stewardship Division, MoE 2nd Fl - 10470 152rd St Surrey, BC V3R 0Y3	Phone: 604-582-5200 Fax 604-930-7119
3.	Thompson	Regional Water Manager Water Stewardship Division, MoE 1259 Dalhousie Dr. Kamloops, BC V2C 5Z5	Phone: 250-371-6200 Fax: 250-828-4000
4.	Kootenay	Regional Water Manager Water Stewardship Division, MoE 205 Industrial Rd. G Cranbrook, BC V1C 7G5	Phone: 250-489-8540 Fax: 250-489-8506
	Subregion office	401-333 Victoria St. Nelson, BC V1L 4K3	Phone: 250-354-6332 Fax:
5.	Cariboo	Regional Director Water Stewardship Division, MoE 400-640 Borland St. Williams Lake, BC V2G 4T1	Phone: 250-398- 4530 Fax: 250-398- 4214
6.	Skeena	Regional Director Water Stewardship Division, MoE PO Box 5000, 3726 Alfred Ave. Smithers, BC V0J 2N0	Phone: 250-847-7260 Fax: 250-847-7591
7.	Omineca	Regional Director Water Stewardship Division, MoE 4051 18th Ave. Prince George, BC V2N 1B3	Phone: 250-565-6135 Fax: 250-565-6629
8.	Okanagan	Regional Director Water Stewardship Division, MoE 102 Industrial Place Penticton, BC V2A 7C8	Phone: Fax:

9.	Peace	Regional Director Water Stewardship Division, MoE 400-10003 110th Ave. BC V1J 6M2	Phone: 250-787-3411 Fax: 250-787-3490

Appendix 9. Community Water Supply Wells, Groundwater Reports and Well Test Analyses in Support of a CPCN[2]

1. General Information

Well performance and aquifer capabilities must be adequately assessed where a groundwater supply is to be developed for community use. Certain procedures must be followed in well testing and the presentation of groundwater information to the Comptroller of Water Rights for a CPCN under the Water Utility and Utilities Commission Acts. The intent of these requirements is not to lay down rigid rules but to avoid unnecessary delays or retests at the applicant's expense due to inadequate test procedures or report presentations. The Comptroller will, on request and with the assistance of the Groundwater Section, review the requirements for any particular case with the applicant or the applicant's professional hydrogeologist[3] prior to the well test.

2. Retain a Professional Hydrogeologist at the Start

The applicant is advised to retain the services of a consulting professional hydrogeologist before the well is drilled and tested. In the past, some applicants have had the well drilled and/or tested prior to hiring a professional hydrogeologist. In these cases, the professional hydrogeologist would not have had adequate input into the well siting, design, and testing stages of the work. This has resulted in having to retest and, in some cases, re-drill the well because testing was inadequate or the well was not properly sited or constructed.

The need for a professional hydrogeologist can not be over-emphasized. Retain a hydrogeologist to design, supervise and report on the development of the groundwater supply from start to finish to ensure adequate well construction and testing procedures are followed.

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[2] This document also replaces Appendix No. 5, Community Water Supply Wells – Groundwater Reports and Well Tests in Support of a Certificate of Public Convenience and Necessity in *Guidelines for Minimum Standards in Water Well Construction, Province of British Columbia* (1982).

[3] A professional hydrogeologist is a person who is registered as a Professional Geoscientist (P.Geo.) or a Professional Engineer (P.Eng.) with the Association of Professional Engineers and Geoscientists of British Columbia with competency in the field of hydrogeology.

3. Contents of the Groundwater Report

The final groundwater report presented should discuss such points as:

1. water supply requirements,
2. well design, construction and development methods,
3. well lithology and hydrogeologic setting,
4. type of aquifer and aquifer boundaries,
5. recharge conditions,
6. well interference,
7. potential impact on licensed water users and existing wells,
8. water quality,
9. possibility of pollution, including salt water and other unpotable water,
10. long-term well capacity and how it was calculated,
11. recommendations on operation of the well, e.g., over pumping, backwashing, raw hiding, redevelopment, etc.,
12. recommendations on a future monitoring program, installation and monitoring of observation well(s),
13. recommendations on well and aquifer protection, e.g., estimating the recharge area to the well, identifying the potential groundwater protection issues in the area and outlining a well protection plan to address those issues.

The report should include a site plan showing locations of the well sites, locations of any unsuccessful test well sites, and any neighbouring wells. Show the sites in relation to existing gazetted roadways, streams and lakes, sanitary land fills, septic field disposal, and the boundaries of any municipalities, improvement districts, etc., in the vicinity. The site plan should show the locations of water sources of other water works within 1 km (one half mile) of the boundaries of the proposed utility. The location of any wells that may be affected through interference by pumping of the applicant’s well should also be indicated. Show the legal description of the proposed well site areas, including registered plan and lot numbers as assigned by the Local Land Registry Office. Approximate elevations (to within +/- 0.5 m) should be given on each well and on important adjacent features such as lake levels, river levels, etc. This is especially important for wells located near the ocean, since the pumping water level relative to sea level is a determining factor in estimating well capacity.

The report should contain a copy of the well driller's original log for every hole drilled under the program, and also a sketch showing well design

specifications for each completed well. For wells completed in fractured bedrock, report the location and flow rate of each major water-bearing fracture. Details should be given of the pumping equipment used, and the method of measurement for water well readings and for flow.

The report should also include a cross-section(s), where appropriate, showing the subsurface hydrogeology, location and extent of the aquifer, and known piezometric water levels. Relevant information (e.g., location of other wells and main topographic features) should also be shown. Indicate the location of the cross-section(s) on the site plan.

4. Well Testing

There are standard procedures for pumping tests, recording of data (e.g., Driscoll, 1986) and report preparation. For example, the drawdown and recovery measurements in the pumped well and in the observation wells should be measured in metres to the nearest 0.005 metre (or feet to the nearest one hundredth of a foot). The time intervals for both drawdown and recovery readings should be short enough to adequately record any rapid drawdown during start of pumping and any rapid recovery immediately after pump shut-down. The time interval after these initial periods can of course then be lengthened between the readings. The pumping rate Q is to be expressed in litres per second (L/s) or U.S. or Imperial gallons per minute. The pumping rate Q is to remain constant throughout the period of pumping, in the final "constant rate" test. This test will involve continuous pumping at a constant rate for 24 hours or longer (see below). Step drawdown tests or "maximum drawdown" tests can be used initially to determine the Q rate.

To prevent well water from returning to the aquifer during the pumping test period, lay sufficient discharge pipe away from the test well. Refer to the tables at the end of this section for the type of information to be recorded in pumping and recovery tests. Report records of any rainfall, tidal variation, or barometric variation immediately before, during and after the well test, if applicable. Also report the start and stop of pumping of any nearby wells that may interfere with the drawdown in the pumping well.

4.1 Boundary Conditions

If recharge or discharge boundaries are detected, then more frequent measurements are also recommended. This can best be done by returning to the time interval set out for the start of the test, i.e., "every minute from 1 to 10 minutes," etc. It is important to continue pumping long enough to establish the drawdown trend affected by the boundary condition. The physical basis for the interpretation of the type of boundary condition should be explained. For example, did the water level in the pumping well stabilize because of

induced infiltration from a nearby lake or because of an increase in aquifer transmissivity? What physical evidence is there?

4.2 Induced Infiltration

This condition could apply in well sites located adjacent to a surface water body: river, lake, etc. If equilibrium test conditions are clearly shown, that is, a stable water level in the well in conjunction with a uniform rate of pumping, the test may be terminated prior to the recommended standard 24 hour pumping period.

4.3 Fractured Bedrock

For wells located in fractured bedrock, the pumping rate should be at or in excess of the supply requirements of the application. Hold the pumping rate constant throughout the testing period, which should last for a minimum of 72 hours. Report the location and estimated flow rate of each major water-bearing fracture in the well. In the Gulf Islands and in coastal areas wells should only be tested in the middle and late summer and early fall periods when recharge is minimal. In the interior of the province, wells are only to be tested in the fall to spring period when water levels are not affected by snow melt. The applicant and professional hydrogeologist should coordinate their activities to conduct well testing during the stipulated periods. This would avoid unnecessary delays and facilitate a more accurate estimate of well performance.

It is also recommended that prior to testing wells completed in fractured bedrock, public notices be posted in the local area or written notices be provided to neighbouring property owners to inform residents that a pump test will be conducted. The residents can bring forward for consideration, prior to the pump test, any concerns or requests for having their well monitored, so these concerns can be addresses.

4.4 Flowing Artesian Condition

In this special case it is essential to check the artesian pressure head prior to and after a pumping test to assess whether the water level recovers completely after pump testing. The artesian pressure is usually measured with a pressure gauge sealed at the well head; at least two readings, before pump testing and after recover, should be made.

Sometimes the artesian pressure head is not measured but is assumed to be at ground level (or top of casing). This assumption, however, causes the available drawdown in the well to be under-estimated, resulting in a lower capacity calculated for the well and does not allow recovery after pump testing to be adequately assessed.

4.5 Coastal Aquifers

It is important that the recommended procedures for taking samples of the pumped well water for full chemical analyses be followed.

It is also strongly recommended that a field test kit be available for testing specific conductance and/or the chloride content of the pumped water during the pumping test. The field kit should measure specific conductance to within +/- 5 μS/cm and chloride to within +/- 5 mg/L. The purpose is to try to determine possible sea water encroachment. The professional hydrogeologist should determine, prior to the pump test, the maximum specific conductance and/or chloride concentration that should not be exceeded during pumping. If encroachment is evident, the pump test may have to be terminated. In coastal aquifers the professional hydrogeologist should include data on local tidal fluctuations where these are affecting the apparent drawdown in the test well. Tidal effects should be filtered out of the drawdown and recovery data prior to interpretation (see Dawson and Istok, 1991, for techniques). The elevation of the pumping and non-pumping well water level should also be reported (to within +/- 0.5 m) because the water level relative to sea level may affect how the long-term well capacity is calculated for wells in coastal aquifers.

4.6 Developed Springs and Seepage Sites

In the case of springs and seepage areas developed by excavation into ponds and "holding reservoirs" the following procedures are recommended. The excavation dimensions should be measured. Pump the reservoir dry (if practical) and take recovery measurements as specified above. Obtain the full recovery. Make notes regarding entry of water into the excavation where possible.

5. Water Quality

Take at least one sample of the pumped well water near the end of the pump test and send it for chemical analyses. The analyses should include all major ions, iron and manganese, and tests for other metals if known to be present in the groundwater of the area. A list of recommended parameters is given in Section 1. Preferably, take two water samples; one near the end of the pumping test and one near the beginning of pumping, e.g., almost one hour after start of pumping. The professional hydrogeologist is expected to make arrangements with a commercial laboratory for this service. Adhere to the laboratory's requirements for sample collection, handling and delivery. Take samples for bacteriological analyses according to the requirements specified by the local health authority. (See Section 2.)

In reviewing water quality for water supply wells, the Groundwater Section, Ministry of Water, Air and Land Protection, considers the following:

1. the cation/anion charge balance of the sample and the amount of total versus dissolved concentrations to check gross errors,

2. potability of the water for intended use, and

3. potential for the water to encrust or corrode, which may affect maintenance costs and operational life of the well.

In addition to collecting samples for laboratory analyses, water quality should be monitored in the field with field analysis kits. Two water quality parameters recommended for monitoring in the field are pH and specific conductance. Measurement of field pH is important because pH in the sample bottle may change during transit to the laboratory. Measurement of specific conductance may provide clues to potential for sea water encroachment or interception of source of surface water recharge, for example.

6. Well Interference

Assess the impact of pumping of the water well on other private wells in the area. In assessing well interference, the hydrogeologist should measure drawdown in nearby wells, wherever possible during the pumping test.

7. Impact on Licensed Water Users

Assess the impact of pumping of the water well on surface water and springs in areas where water licences are known to exist. It may be necessary to monitor flows of nearby spring and surface water sources during the pumping test.

8. Estimating Well Capacity

In reviewing long-term capacities for water supply wells, the Groundwater Section, Water Stewardship Division, considers the following four main criteria:

1. adequacy of the pump test procedures,
2. the performance of the well as indicated by the long-term specific capacity,
3. the available drawdown in the well,

4. other factors that may impact well capacity.

Pump test procedures are discussed above. In assessing well performance, the well's specific capacity after 100 days of continuous pumping is estimated from the drawdown data. The 100 days of continuous pumping represent a period where no recharge occurs (summer and fall months in coastal areas and fall and winter months in the interior). Recharge is assumed to occur annually with winter rains or snow melt. The available drawdown in a well is typically the distance between the non-pumping water level and the top of the well screen, top of the confining layer, to sea level, to the uppermost major water-bearing fracture (bedrock well), depending on the appropriate situation. A safety factor, usually 30% of the available drawdown, is allowed in calculating the well capacity. Estimate well capacity by multiplying the specific capacity at 100 days with the safe available drawdown in the well (total available drawdown minus the 30% safety).

Other factors that may affect well capacity, such as well interference, impact on licensed surface water, aquifer mining, sea water encroachment, for example, are considerations in estimating the long-term capacity.

The estimated capacity for the well **should not exceed** the flow rate at which the well was pump tested. One exception would be if the pump test results indicate that the aquifer's yield is significantly greater than the well requirements.

9. Special Requirements Attached to the Certificate

Certain conditions may be attached to the certificate with regard to the well source. For example, further collection of data during subsequent well operations and possibly a hydrogeological report may be needed. These special requirements may be applied where legal problems arise in the development of groundwater supplies, such as groundwater withdrawals affecting stream and spring flows which may be under licence, where supplies of water to an adjacent well may be affected by pumping or where a producing aquifer is suspected of being limited in extent or capacity.

10. References

Dawson, K.J. and J.D. Istok, 1991. Aquifer Testing-Design and Analysis of Pumping and Slug Tests. Lewis Publishers, Inc., Chelsea, Michigan, 344 pp.

Driscoll, F.G., 1986. Groundwater and Wells. Second edition, Johnson Division, St. Paul, Minnesota, 1089 pp.

Ministry of Environment, 1982. Guidelines for Minimum Standards in Water Well Construction, Province of British Columbia. Groundwater Section, Water Stewardship Division, 35 pp.

11. Acknowledgements

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Pumping Test

Depth to water in well from top of casing before test: _____metres

Time	Time Since Start of Pumping (minutes)	Depth to Water in Well from Top of Casing (metres)	Discharge from Well (litres/minute)	Field water quality measurement	Comments

For the above table, readings should be taken every minute from 1 to 10 minutes and then every 10 minutes from 10 to 120 minutes (2 hours), then readings every 1½ hours thereafter.

A preferred method for ease in plotting the data, but one that is harder to comply with is as follows:

1. Readings every 30 seconds from 1 to 5 minutes
2. Readings every minute from 5 to 10 minutes
3. Readings every 2 minutes from 10 to 20 minutes
4. Readings every 5 minutes from 20 to 50 minutes
5. Readings every 10 minutes from 50 to 100 minutes
6. Readings every 50 minutes from 100 to 500 minutes
7. Readings every 100 minutes thereafter

Whenever possible, monitoring of the drawdown and recovery in other wells in the vicinity is recommended. Electronic data loggers can be used to measure the well water level but the logger readings should be calibrated through manual readings.

Recovery Test

Time	Time Since Start of Pumping	Time Since Pumping Stopped (minutes)	Depth to Water in Well from Top of Casing

	(minutes)		(metres)

For the above table, readings should be taken every minute from 1 to 10 minutes and then every 10 minutes from 10 to 120 minutes (2 hours), then readings every 1½ hours thereafter. Slow recovery may require that the last readings be spaced as much as 8 to 12 hours apart.

A preferred method for ease in plotting the data, but one that is harder to comply with is as follows:

1. Readings every 30 seconds from 1 to 5 minutes
2. Readings every minute from 5 to 10 minutes
3. Readings every 2 minutes from 10 to 20 minutes
4. Readings every 5 minutes from 20 to 50 minutes
5. Readings every 10 minutes from 50 to 100 minutes
6. Readings every 50 minutes from 100 to 500 minutes
7. Readings every 100 minutes from 500 to 1,000 minutes
8. Readings every 500 minutes from 1,000 to 5,000 minutes

Section 1
List of Recommended Parameters for Chemical Analyses*

	Units
Phen. Alkalinity	mg/L
Total Alkalinity	mg/L
Sulphate ($SO_4^{=}$)	mg/L
Nitrite-Nitrogen and Nitrate-Nitrogen (NO_2-N + NO_3-N)	mg/L
Total Kjeldahl Nitrogen (TKN)	mg/L
Total Phosphorous (P)	mg/L
Fluoride (F^-)	mg/L
Chloride (Cl^-)	mg/L
Calcium (Ca^{++})	mg/L
Magnesium (Mg^{++})	mg/L
Sodium (Na^+)	mg/L

Potassium (K^+)	mg/L
Manganese (Total and dissolved) (Mn)	mg/L
Iron (Total and dissolved) (Fe)	mg/L
Silica (SiO_2)	mg/L
Sp. Conductance	□mhos/cm at 250°C
pH	relative units
Total Dissolved Solids (T.D.S.)	mg/L
Total Hardness ($CaCO_3$)	mg/L
Turbidity	(J.T.U.)

- Additional parameters may be required by the local authorities where known or suspected sources of pollution or naturally occurring water quality concerns exist (e.g., Arsenic, Uranium, Volatile Organic Compounds). In the Vancouver Island and Coast Garibaldi regions, the local health authority may require additional parameters for analysis, depending on whether the well is shallow or deep (e.g., colour, total or dissolved organic carbon, ammonia, turbidity, sulphide, metals, iron and sulphate reducing bacteria).

Section 2
Bacteriological Quality and Collection Procedures

Take a sample on all wells to determine bacteriological quality. For new or repaired wells AWWA AIOO-66 recommends collecting any sample for determination of bacteriological quality following the disinfection of the well. First remove chlorine solution from the well by pumping, and reduce chlorine residual to less than 2 ppm before the sample is taken. Take special care in collecting the sample to avoid contacting the inside of the bottle or the cap with fingers. Request that the local public health inspector obtain a sample for bacteriological analyses when the water is to be used for a public water supply system. In situations where this is not possible, obtain sample bottles and advice on sampling techniques through the local health district.

Reliability of Sample Results

The quality of any drinking water supply cannot be determined with confidence from the result of a single sample. Determining water quality is possible only by observing the results of several samples over a long period of time. Shallow wells that may be influenced by surface contamination near the well may produce water of varying quality depending on the climatic and physical conditions. Therefore, if a sanitary survey shows a well water supply to be obviously subject to pollution, the water may be condemned regardless of the test results.

APPENDIX III

Description of Water Balance Model

Description of Water Balance Model Calculation Method

Introduction

The method selected for evaluating groundwater recharge and discharge is a quarter monthly water balance approach commonly used for hydrologic evaluations. (see Alley, 1984 and Steenhuis and Van der Molen, 1986). The method provides a simple technique to include the interaction of surface water and groundwater components of a flow system and to include climate data, streamflow data and snowpack data.

Discretization

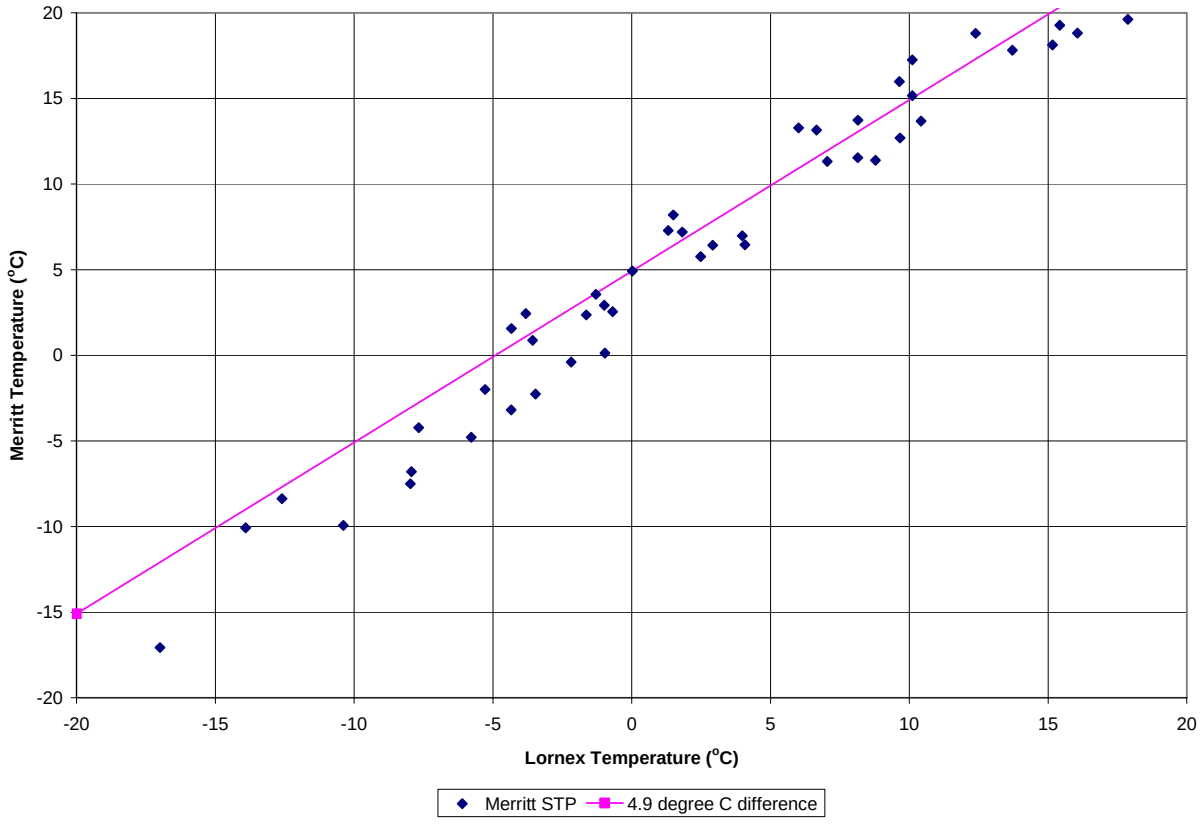
The study area was divided into sub-catchments. Sub-catchment areas were defined by topographic controls on drainage and the need to examine water flow rates and volumes. For example, most of the sub-catchment boundaries were defined by the drainage area reporting to surface water gauging stations and using the understanding of the relevant aquifers.

Each of the sub-catchments were further discretized by elevation. The elevation bands selected were 200 metre intervals, starting at 400 metres above sea level (masl). Representative climate conditions (temperature and precipitation) were calculated for the centre elevation of each elevation band.

Temperature and Precipitation

Temperature in the Nicola Basin was assumed to follow temperature measured at Lornex, with an altitude adjustment of 6.5^{o} C per kilometer (153.85 m per ^{o}C). Figure 1 illustrates measured average monthly temperatures at Lornex and Merritt.

Figure 1 Comparison of Average Monthly Temperature



There is a 759 m elevation difference, so that the expected temperature difference between the two stations would be about 4.9 ^{o}C. As illustrated on Figure 1, this temperature difference is approximately

correct in the warm season, but the Merritt temperatures are closer to the Lornex temperatures in the winter, probably as a result of cool air being trapped in the valley.

The temperature was adjusted to the middle elevation of each elevation band using:

$$T = T_s - \frac{(E-E_s)}{153.85}$$

where
- T = required temperature (^oC).
- T_s = temperature at Lornex (^oC).
- E = elevation of middle of elevation band (masl)
- E_s = elevation at Lornex (masl)

Annual average precipitation has been measured from 264 mm at Spences Bridge to about 770 mm at Elkhart lodge. Precipitation varies both with position and with elevation. The position relates to the direction that weather approaches the region. Higher precipitation near high ground is a common occurrence. To allow comparison of measured precipitation over the basin from stations with a variety of monitoring periods, double mass curves were prepared. A mass curve is simply the cumulative precipitation over the period of record. Plotting the cumulative precipitation for one station with the cumulative distribution for a second station, using the same time period creates a double mass curve. For this study all double mass comparisons were plotted against the Lornex station on the x axis. The slope of the double mass curve provides a ratio of the station rainfall to the Lornex rainfall. An example of two double mass curves, presented on Figure 2, illustrates the ratio for Merritt and Spences Bridge versus Lornex. Table 1 below tabulates the ratios calculated for each station.

Figure 2 Double Mass Curves for Merritt STP and Spences Bridge

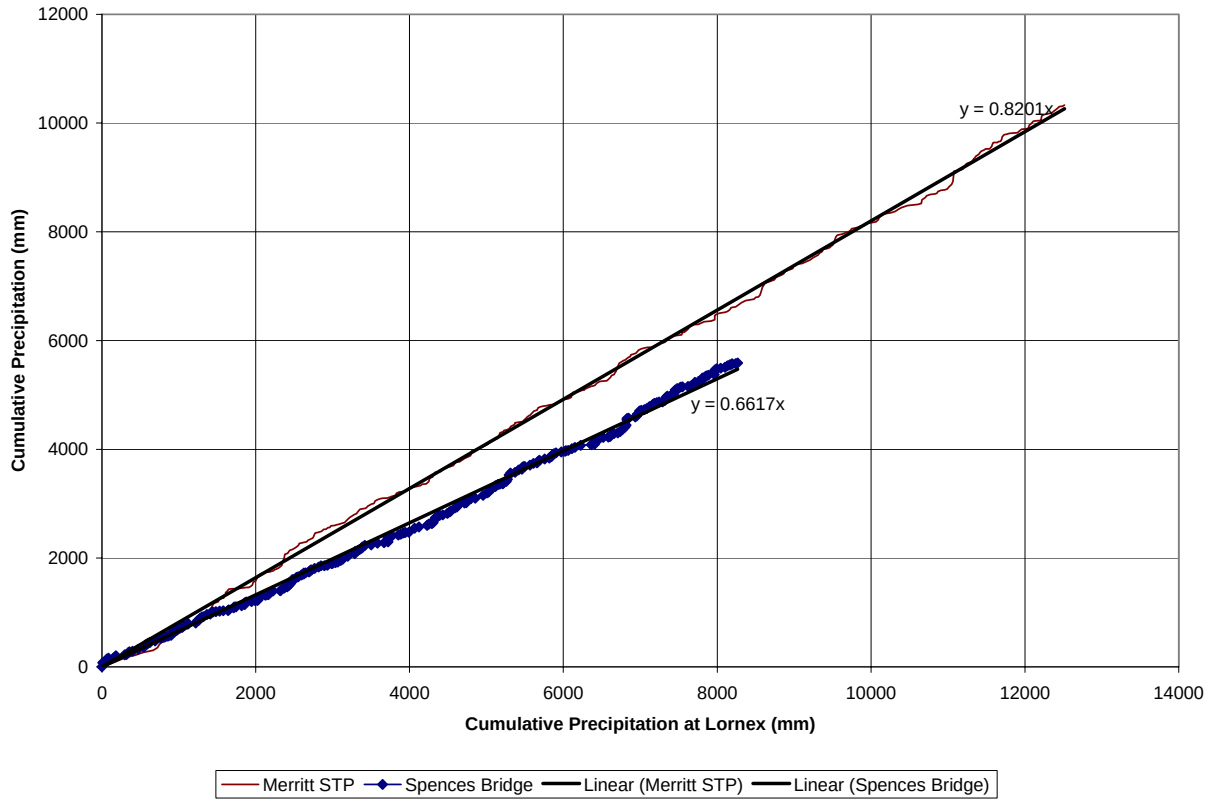


Table 1: Precipitation Ratios for meteorological Stations in the Nicola Basin

Station	Elevation (m)	Period		Ratio*	Curve number
Lornex	1268	Jan-67	Mar-01	1.00	1.4
Brookmere	972	Jul-86	Feb-94	1.43	2.0
HVC BCCL	1470	Jan-67	Jun-86	0.97	1.4
Lac le Jeune	1305	Oct-85	Nov-88	1.13	1.4
Meadowgreen	1207	Jun-80	Jun-86	1.10	1.4
Craigmont	732	Jan-67	Apr-76	0.81	1.4
Merritt STP	609	Aug-68	Mar-01	0.82	1.4
Nicola Lake W	633	Dec-84	Feb-92	0.77	1.4
Douglas Lake	808	May-79	Mar-01	0.84	1.6
Elkhart Lodge	1615	Aug-92	Jan-95	2.13	1.6
Logan Lake	1101	Jul-85	Mar-01	1.01	1.4
Nicola Lake	633	May-79	Jan-85	0.73	1.4
Spences Bridge	235	May-80	Mar-01	0.66	1.4

* Ratio of precipitation at station to precipitation at Lornex

The distribution of precipitation to snow and rainfall assumed that all precipitation fell as rain if the average quarter monthly temperature was greater than 2^{o}C and all as snow if the average quarter monthly temperature was below -1^{o}C. In between the ratio of precipitation as snow was varied linearly with the temperature between -1^{o}C and 2^{o}C.

Sublimation

Sublimation is complex and requires tabulation of a number of variables for a rigorous determination. Sublimation was allowed in the months November through April. Although sublimation rates may be high during snowmelt, the sublimation is often countered by night time condensation into the snow pack. Sublimation therefore was not considered for May and June. The snow was assumed to sublimate at the set rate until none remained on the ground.

Snowmelt

Although snowmelt can be estimated, the required meteorological parameters are not available for this site. The snowmelt was estimated using a temperature index method. The actual snowmelt was up to the potential after considering the available snow after sublimation. The water available each month was calculated as the sum of snowmelt and rainfall.

Evapotranspiration

Evapotranspiration was calculated with a methodology after Thornthwaite (1948). First, the potential unadjusted monthly evapotranspiration (PET) was estimated based on the average monthly temperature in degrees Celsius (T).

$$PET\ (in) = 0.63(10T/I)^{a}$$
Where $a = 6.751 \times 10^{-7}(I^3) - 7.71 \times 10^{-5}(I^2) + 1.792 \times 10^{-2}(I) + 0.49239$
And I is the sum of the i values for the year,
Where $i = (T/5)^{1.514}$

The unadjusted rate was adjusted for the number of days in the month and the number of hours in the day between sunrise and sunset which varies with season and latitude. The number of days corrections was achieved by multiplying by the number of days in the month and dividing by 30. The equation used for the latitude correction was:

$(24\cos^{-1}(-\tan(L\Pi/180)\tan(0.4093\sin(2\Pi(\text{int}(30.4m-15))(365-1.39)))/12\Pi$
Where L is latitude, and m is month number (1 to 12).

The actual evapotranspiration (AET) was calculated as part of the soil water balance. Typically, the PET represents the evapotranspiration for a full vegetation cover on relatively flat tilled ground with no shortage of water. The AET varies across different landforms, soil types, rainfall distribution and vegetation types, so the value was adjusted for forested, non-forested and Mountain Pine Beetle infested by adjusting a surplus water evapotranspiration factor. The AET was limited by the water available each quarter month. For example if there was less snowmelt and rainfall in a given month than the PET, then the AET was less than the PET. Evapotranspiration was also limited by the soil moisture condition. Below the soil moisture capacity of the soil, the PET was reduced linearly with soil moisture as follows:

Adjusted evapotranspiration = $(S_2 + S_1)\, f\, (PET)/(2S_m)$
Where S_m is soil moisture capacity
S_1 is soil moisture at the beginning of the quarter month and
S_2 is soil moisture at the end of the quarter month
PET is the calculated full PET
f is the reduction factor for non-ideal conditions for evapotranspiration

Open water such as lakes was assumed to evaporate at the full PET.

Soil water balance: The monthly soil water balance was calculated assuming the soil profile could retain some moisture from quarter month to quarter month. A maximum soil moisture retention was estimated, in this case between 200 and 250 mm to represent average site conditions. Consideration of sublimation, snowmelt, rainfall and AET allowed for an estimation of water available for infiltration and runoff. For each month, the soil moisture was calculated based on the formula

$$S_2 = W + S_1 - (S_2 + S_1)\, f\, (PET)/(2S_m)$$

Solving for S_2

$$S_2 = (W + S_1(1 - f\, (PET)/(2S_m))/(1 + f\, (PET)/(2S_m))$$

Where required, the soil moisture was then adjusted if the monthly temperature was less than the base recharge temperature (0.5^oC). Knowing the soil moisture at the beginning and the end of the quarter month provided an estimate of the soil moisture change.

Water available for runoff and recharge

The water available for runoff and recharge (V, surplus) was then calculated by subtracting the actual evapotranspiration and soil moisture change from the rainfall and snowmelt for the month.

$$V = W - f(PET)(S_2 + S_1)/ (2S_m) - (S_2 - S_1)$$

This unit value of surplus water was multiplied by the catchment area for each sub-catchment to provide input to the water balance calculation.

Groundwater recharge
Groundwater recharge of the water available for runoff and recharge was estimated with an adjustable rate to allow variation in response to effects from surface conditions, soil permeability and available storage capacity. The infiltration was set equal to available water up to a volume equal to the product of an infiltration rate and the sub-catchment area (k_1A). For wetter months, a fraction (k_2) of the remaining available water was infiltrated ($k_2(W - k_1A)$). Therefore:

For precipitation less than or equal to k_1A

$I\ (m^3/month) = W$

For precipitation greater than k_1A

$$I\ (m^3/month) = k_1A + k_2(W - k_1A)$$
$$= k_2W + k_1A(1 - k_2)$$

For snowmelt conditions, when runoff over snow and frozen ground would limit groundwater recharge, the recharge was reduced from the above by 30%.

Groundwater storage and discharge

A linear reservoir model was used to store and release groundwater. Water was recharged into storage in each sub-catchment. The recharged water accumulated within the groundwater compartment was released at a rate determined by the product of the average volume of water in storage ($V_1/2 + V_2/2$) and a discharge factor (j). Quarter monthly discharge was therefore set equal to:

$$D = j(V_1/2 + V_2/2)$$

In this way, storage was allowed within each sub-catchment, with increasing discharge rate with increasing storage. The volume of water in storage was therefore a sum of the storage in the preceding quarter month (V1) plus the volume of water entering the system (I) minus the quantity discharged (D). Therefore:

$$V_2 = V_1 + I - D$$
$$= V_1 + I - j(V_1/2 + V_2/2), \text{ so solving for V2}$$
$$= (I + V_1(1-jV_1/2))/(1 + jV_1/2)$$

Corrections were included to prevent negative storage. Lower discharge factors resulted in larger accumulated storage with the same recharge. The effect of decreasing the factor was to cause a more uniform discharge rate.

Groundwater discharged off site and on site

The estimate of groundwater discharged from a sub-catchment could go as groundwater into a downstream sub-catchment or could discharge within the sub-catchment and join the surface water discharge from the sub-catchment. The groundwater leaving the sub-catchment as groundwater was assessed by taking the product of estimated values for transmissivity (T), width (w) and hydraulic gradient (i). The remainder was discharged on site to join the surface water.

Surface water detention and storage

The quantity of water reporting to surface water is the difference between water available for runoff and recharge and the recharge volumes. Some of that water will runoff within the month and some will be detained. Many sub-catchment areas include lakes that were modeled as distinct water bodies. Within this water balance methodology these detention features were managed with the same type of detention (recharge) and linear reservoir model as groundwater recharge, storage and discharge. However, typically, the discharge factor was higher for surface water.

Model Structure

For each sub-catchment, the water available for runoff and recharge was calculated based on the Thornthwaite calculation and the sub-catchment area. Recharge was calculated and added to groundwater in storage. Groundwater was stored and released at a rate proportional to the average volume in storage. The groundwater released was passed on to the next sub-catchment downstream as groundwater up to an amount defined by estimated transmissivity, width and gradient in the groundwater system. The remainder of the released water was discharged within the sub-catchment and was passed on to the next sub-catchment downstream with the surface water. The water that was not recharged was either passed on to the next sub-catchment downstream as immediate runoff or was added to surface water detained in

the sub-catchment. In the cases with surface water detention, that water not detained was passed on as immediate runoff. Detained water was released as a proportion of the average volume of water detained.

Table 2 presents the various groundwater and climate parameters used for each of the sub-catchment areas.

Table 2: Sub-catchment Parameters

Area #	Name	Recharge Factor 1	Recharge Factor 2	Discharge Factor	Transmissivity (m^2/day)	Aquifer Width (m)	Gradient	Curve Number
1	Beak Creek	0.002	0.001	0.1	21.60	50	0.01	1.77
2	Nicola/Chapperon	0.008	0.02	0.08	64.80	750	0.01	1.60
3	Range Creek	0.01	0.02	0.05	43.20	2000	0.005	1.35
4	Douglas Lake Catchment	0.01	0.02	0.05	129.60	1000	0.005	1.35
5	Pennask Creek	0.008	0.001	0.2	64.80	800	0.01	1.84
6	Pennask Lake Catchment	0.01	0.02	0.06	21.60	500	0.01	1.77
7	Spahomin Creek	0.008	0.02	0.04	43.20	800	0.005	1.35
8	Lauder Creek	0.01	0.02	0.04	43.20	800	0.005	1.35
9	Upper Nicola River	0.01	0.02	0.1	108.00	1000	0.008	1.35
10	Stump Lake Catchment	0.006	0.02	0.04	12.96	1000	0.008	1.35
11	Stump Lake Creek	0.008	0.02	0.04	64.80	500	0.008	1.35
12	Moore Creek	0.008	0.02	0.04	64.80	500	0.008	1.35
13	Quilchena Creek	0.05	0.05	0.06	64.80	500	0.01	1.77
14	Nicola Lake Catchment	0.006	0.02	0.1	129.60	1000	0.008	1.35
15	Clapperton Creek	0.006	0.02	0.05	64.80	800	0.008	1.35
16	Hamilton Creek	0.004	0.02	0.04	21.60	1000	0.005	1.35
17	Lower Nicola 1	0.008	0.02	0.1	129.60	1000	0.008	1.35
18	Upper Coldwater Creek	0.004	0.002	0.15	21.60	150	0.01	2.87
19	Voght Creek	0.004	0.001	0.1	8.64	10000	0.01	2.00
20	Midday Creek	0.004	0.001	0.1	8.64	15000	0.01	2.00
21	Coldwater River	0.005	0.001	0.1	129.60	2700	0.01	2.00
22	Lindley Creek	0.004	0.02	0.04	21.60	500	0.005	1.35
23	Lower Nicola Plateau	0.004	0.02	0.03	4.32	500	0.005	1.35
24	Upper Guichon Creek	0.001	0.001	0.02	64.80	200	0.01	1.41
25	Axe Creek	0.002	0.02	0.05	21.60	2500	0.005	1.41
26	Highland Valley	0.01	0.02	0.02	43.20	440	0.01	1.41
27	Dupuis Creek	0.003	0.02	0.04	21.60	2000	0.005	1.41
28	Meadow Creek	0.005	0.02	0.03	21.60	1500	0.005	1.35
29	Middle Guichon	0.006	0.02	0.05	43.20	1000	0.008	1.35
30	Tyner Creek	0.004	0.02	0.04	21.60	3000	0.008	1.35
31	Steffens Creek	0.006	0.02	0.04	21.60	4000	0.008	1.35
32	Lower Guichon	0.006	0.02	0.05	129.60	2000	0.008	1.35
33	Lower Nicola 2	0.008	0.02	0.08	129.60	1500	0.01	1.35
34	Maka Creek	0.002	0.001	0.15	21.60	200	0.01	2.90
35	Upper Spius Creek	0.0015	0.001	0.15	21.60	180	0.01	2.87
36	Lower Spius Creek	0.003	0.002	0.05	43.20	700	0.01	1.86
37	Pony Creek	0.004	0.02	0.04	21.60	500	0.008	1.35
38	Skuhun Creek	0.003	0.02	0.04	21.60	4000	0.008	1.35
39	Skahan Creek	0.002	0.02	0.04	21.60	4000	0.008	1.35
40	Lower Nicola 3	0.008	0.02	0.08	21.60	500	0.01	1.35

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APPENDIX IV

List of Contacts

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Barb Jackson	Thompson-Nicola Regional District
Lloyd Bie	Earthtec
Don Duncan	Stonefield Development Consultants
Joe Demato	Coquihalla Pass All-Season Resort

APPENDIX V

Description of Data CD

Description of Data CD

Included with the Surface and Groundwater Supply and Interaction Study – Phase 1 and 2 is a CD containing the data used for developing the surface water and groundwater flow estimates. Table 1 includes a description of the meteorological stations used in the study. Table 2 includes a description of the snow course stations used in the study. Table 3 includes a description of the hydrometric stations used in the study. Climate data was collected from Environment Canada's National Climate Data and Information Archive. Snowpack data was collected from British Columbia Ministry of Environment Water Stewardship Division River Forecast Centre. Hydrometric data was collected from Environment Canada's Water Survey HYDAT database. The measured data from each station in table 1, table 2 and table 3 are include in the Data CD. Also included in the Data CD are five map sheets of surficial geology from the Geological Survey of Canada.

Table 1: Meteorological Stations

Station	Station ID	Elevation	Latitude		Longiude		Active dates	
			Degrees	Minutes	Degrees	Minutes	Start	End
Brookmere	1121090	972	49	49	120	52	1986	1994
Douglas Lake	1122541	808	50	9	120	12	1979	2006
Elkhart Lodge	112K653	1615	49	55	120	21	1992	1995
Highland Valley BCCL	1123468	1470	50	30	121	0	1966	1989
Highland Valley Lornex	1123469	1268	50	28	121	1	1967	2006
Lac Le Juene	1124460	1305	50	28	120	31	1984	1988
Logan Lake	1124668	1101	50	30	120	49	1971	2004
Meadowgreen	1125060	1207	50	28	120	40	1980	1986
Craigmont	1125075	732	50	12	120	52	1962	1976
Merritt STP	1125079	609	50	6	120	48	1968	2006
Nicola Lake	1125586	633	50	15	120	27	1979	1985
Nicola Lake West End	1125590	642	50	10	120	37	1984	1992
Spences Bridge	1167637	235	50	25	121	19	1980	2002

Table 2: Snow Course Stations

Station Name	Station ID	Elevation (m)	Latitude		Longitude		Available Data	
			Degree	Second	Degree	Second	Start	End
Nicola Watershed								
Shovelnose Mountain	1C29	1450	49	52	120	52	1975	2005
Lac Le Jeune (Lower)	1C07	1370	50	28	120	30	1956	2005
Brookmere	1C01	980	49	49	120	52	1945	2005
Gnawed Mountain	1C19	1580	50	27	121	2	1967	2005
Highland Valley	1C09A	1510	50	30	120	59	1966	2005
Lac Le Jeune (Upper)	1C25	1460	50	27	120	30	1973	2005
Okanagan Boundary								
MacDonald Lake	2F23	1740	49	53	120	2	1977	2005
Islaht Lake	2F24	1480	49	59	119	48	1982	2005
Whiterocks Mountain	2F09	1830	50	1	119	45	1953	2005
Esperon Creek (Upper)	2F13	1650	50	5	119	45	1966	2005

Table 3: Hydrometric Stations

Station Code	Stream Name	Drainage Area (km^2)	Sub-Basin	Latitude		Longitude		Active Dates	
				Degree	Second	Degree	Second	Start	End
08LG064	Beak Creek	85	Upper Nicola	50	7	119	59	1981	2001
08LG048	Coldwater River	316	Coldwater	49	51	120	54	1965	2005
08LG016	Pennask Creek	87	Upper Nicola	49	58	120	8	1920	2005
08LG008	Spius Creek	780	Spius	50	8	121	2	1970	2005
08LG056	Guichon Creek	78.2	Guichon	50	37	120	55	1967	2005
08LG068	Spius Creek	178.6	Spius	49	57	121	5	2000	2005